KPF 1074

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Inserted

Gold Production
Times Oct 1892

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YEAR by year the gold production of the world is increasing, and the results for 1891 were the largest on record. In round numbers, the production for the last five years was as follows—1887, 5,097,600oz.; 1888, 5,251,000oz.; 1889, 5,641,000oz.; 1890, 5,586,000oz.; 1891, 6,033,000oz. For the first time for many years there was a slight set-back in 1890. A noticeable feature of recent years has been the development of the Witwatersrand Goldfields. The production of these fields has been as follows:—1887, 34,897oz.; 1888, 230,917oz.; 1889, 379,733oz.; 1890, 494,801oz.; and 1891, 729,213oz. Adding in 1891 the output of other Transvaal goldfields, which amounted to about 107,000oz., the total production of the Transvaal for 1891 reaches 836,250oz. For the current year it is expected that the production will quite reach 1,250,000oz. In 1888 the Transvaal only produced 4½ per cent. of the world's yield, but in 1891 the proportion had risen to 13·8 per cent., and this year it is tolerably certain to reach 21 per cent. The following was the production in 1890 for the countries named:—United States, about 1,586,500oz.; Australia, 1,469,200oz.; and Russia, 1,019,000oz. As the return for these countries has not altered to any large extent, the Transvaal will probably take the third place for the current year and very likely the second place in 1893. Mining in the Transvaal has not yet reached its culminating point, as the new mines are being constantly opened, and old ones still further developed.—*Times.*

KPF 1074

KANGARILLA SILVER MINES.

Mr. Rosewarne's Estimates.

The following report was forwarded to the Chairman and Board of Directors of the Kangarilla Proprietary Silver-mining Company on January 3 last by the Manager, Mr. D. D. Rosewarne:—On December 28 I made an examination of your mine. The work already done is confined to about 150 ft. north and south of Singleton's Shaft. Thus only a very small proportion of the lode has been in any way tested. The estimates are based on ore in sight only, without taking into consideration any developments which may take place in the various levels as they are driven on the lode. Above the 120-ft. north there is a block containing 4,500 tons. Above the 120-ft. south another block with 1,000 tons. In the 180 ft. north there is a block in which ore has been proved for some distance, and I have placed it on a low estimate of 3,000 tons. The 180-ft. south contains the best show of ore, and the block already opened contains 9,000 tons—total, 18,500 tons. Besides this there is say 2,000 tons on surface, and it must be borne in mind that all along the bottom of the 180-ft. level there is a large body of ore proven which only requires sinking winzes to render available. Take the 20,000 tons this will make 4,000 tons of concentrates, which should average clear of smelting, &c., £13 per ton. The cost of mining will be fairly high on account of the hardness of the ground. I can hardly form an estimate of the actual cost, but 30s. per ton on the rough ore should cover expenses of breaking, dressing, timber, and management, also proportional amount of dead work. Say 2,000 tons per month is treated at a cost of 30s., 3,000 producing 400 tons concentrates, average net value £13 per ton, 5,200, thus leaving a profit of £2,200 per month. The erection of the concentrating plant should be proceeded with at once, estimated cost £4,000, including buildings, &c. Houses, offices, &c., will cost £1,000. Development of mine, until machinery is in regular working order, and returns obtained, £5,000; total, £10,000. In conclusion, I may state that I am very much pleased with the bottom level, and the developments taking place there further strengthen my previously expressed opinion as to the value of your mine.

The Kangarilla Proprietary Directors on receiving the foregoing sent the following cable to Mr. Rosewarne:—"£1,000 remitted to you by telegraph through the Bank at Callington; £3,000 remitted by next mail. Order machinery. Send copy of report to newspaper." The mine machinery will be ordered at once, and the Manager hopes to be able to return ore in July. The water famine that affects the Barrier Silver Mines is never likely to occur at the Aclare Mine, there being two creeks constantly running on the boundaries of the mine. There is evidently a strong desire on the part of the new Directors to give the mine every chance, and it is to be sincerely hoped that the English capitalist who devotes his capital to our mines will meet with some adequate return.

Inscribed
1876

To the
Editor of the Register
with the
compliments of the
Government Geologist.

W. Sonder

A

RECORD OF THE MINES

OF

SOUTH AUSTRALIA.

Prepared under the authority of the Hon. J. H. HOWE, Commissioner of Crown Lands and Immigration,

BY

HENRY Y. L. BROWN, F.G.S.,

GOVERNMENT GEOLOGIST.

Adelaide:

PRINTED BY E. SPILLER, GOVERNMENT PRINTER, NORTH-TERRACE.

1887.

Wm. Pick Esq.

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PREFACE.

My object in preparing the present work has been to attempt to establish a fairly reliable record of the mining operations conducted in this province. As far as possible, I have given the amount of work done on each mine, the strike and underlay of the lodes, the ores they contain, the number of tons of ore raised to the surface, the character of the rock passed through, and of that of the surrounding country.

A number of the mines have been visited by me, but for the most part I have had to rely upon the reports kindly supplied to me by gentlemen connected with mining operations. It is obvious that to have visited every mine would have been, if not an impossible, at least a useless task; for unless a mine is in working order there are no means whereby the shafts can be descended. And even supposing that difficulty to be overcome, the accumulation of water in the workings would present a decided barrier to proper examination.

Great difficulty has been experienced in collecting information respecting abandoned mines; but for many of these I have drawn upon the information contained in Mr. J. B. Austin's pamphlet on "The Mines of South Australia," published in 1863, and Professor Ulrich's report on "The Mineral Resources north of Port Augusta," published in 1872. It will be noticed that some of the better known mines are but meagrely described. This is owing to the fact that the proprietors or managers have not responded to the request made for information, and in many cases it has been possible only to mention the name and locality of the mine.

South Australia has no department of mines such as obtains in Victoria, but the establishment of one would be of great service both to miners and the general public. It may be said that our mineral resources are not sufficiently developed to warrant a separate department being established. But that is not the case. In copper we have done largely, and our territory contains valuable ores and minerals hitherto untouched. The outlook for the copper industry is at present dark and unpromising, nor does there appear to be much prospect of improvement unless some industry, in which copper will be largely used, is initiated.

But silver mining is still profitable, and the demand for gold has not lessened. The search for these precious metals should be pursued with vigor and intelligence. There are, however, three things that prove great drawbacks to mining enterprise in South Australia; two are the scarcity of wood and water in the northern districts, and the third, affecting every portion of the colony, is the high rate of wages.

In the early days of the Moonta and Wallaroo Mines the water difficulty was overcome by condensing the salt water of the mines into fresh drinking water, and subsequently by turning the rain that fell upon the roofs of the houses into large underground tanks. Of the three questions, that relating to wages may be the most difficult of adjustment. One other matter there is that, sooner or later, will demand the serious attention of the people, namely, the right to search for minerals on freehold land.

I desire to here point out an injustice that is done to the *bonâ fide* prospector for minerals other than gold. No sooner is he successful in finding prospects, and takes out a licence, than the land adjoining is at once selected by persons living at a distance, who, on the payment of £1, are allowed to mark out their section on the map, and are entitled to hold it for one year. They have no intention of working these blocks, but hold them until the prospector has shown what the ground yields. This wholesale selection is a check to the development of mineral resources. Under these conditions not much progress in testing the country for minerals will be made. To encourage working prospectors, the rules in force with regard to gold miners might be made to apply to every description of mining with advantage, namely, that the marking out of the ground, and the presence of the miner upon it doing a certain amount of work daily, alone constitutes the right to hold a claim or lease. At present a man may find slight indications of minerals on his own lease, but may see still better ones on other ground. This, however, he cannot prospect, for another man holds it, though probably he is not working it. In this way much land that might prove productive is lying idle.

The first mine opened in South Australia was the Wheal Gawler, a silver-lead mine, situated on the western slopes of the Mount Lofty Ranges, four miles east of Adelaide, and close to the township of Glen Osmond. The discovery of rich specimens of galena on the surface was the cause of the land being purchased from the Government. The mine was opened in 1841, five years subsequent to the proclamation of the province. In consequence, however, of the heavy expenses incurred, operations ceased for some time, and were not resumed until the year 1844, when it was leased to a small company. Other silver-lead mines were opened in the neighbourhood shortly afterwards,

and smelting works established. The profits that resulted were not equal to the expenses, and the mines were abandoned, and have not since been worked. But it has not been proved that these mines are worthless. During the past forty-five years, mining machinery and processes have greatly improved, and a company provided with sufficient capital and patience—two things essential for the proper development of mines—might find the speculation remunerative. The first copper mine, the Kapunda, was found in 1842, and yielded a fortune to its discoverers. The next discovery of copper was the Montacute Mine, in 1843, and a good output was maintained for many years, until the lodes were apparently worked out, and the proprietors were not prepared to search for fresh ones.

In 1845 the Burra Mine was discovered by a shepherd named Pickitt, and a red-letter day was marked in the history of the colony. The capital invested was £12,320, in £5 shares, and no subsequent call was ever made upon the shareholders. At one time the shares were worth £200, and returned £40 each, per annum, in dividends. The total amount paid in dividends was about £800,000. The property was sold to a new company, but for many years has not been worked.

During 1860 and the two following years the Wallaroo Mines were discovered. A mining mania set in, but in many instances the great expectations raised were not realised. Two years later the Moonta Mines, of world-wide celebrity, were opened, and their copper lodes are even now not exhausted. From information kindly supplied by Captain Hancock, I find that up to 30th June, 1886, the value in the colony of ore raised from the Moonta Mine was £4,579,097; from the Kurilla Mine, 1874 to 1884, £155,068; and from the Wallaroo Mining Company, £2,005,023. In the far north a large amount of money was spent in developing the Yudnamutana, Blinman, Sliding Rock, Prince Alfred, and other copper mines; but all these have ceased working, owing principally to the low price of copper.

In silver-lead the Talisker Mine, near Cape Jervis, has been the most productive. It opened in 1862, and was worked for ten years, and then stopped for want of funds. No capital was subscribed, and the company worked on a bank overdraft, and borrowed money, bearing interest at the rate of 10 per cent. The net proceeds of the ore raised equalled £27,846, ranging from £27 to £39 per ton of 20cwt. The amount of silver contained in the lead ranged from 62ozs. to 91ozs. per ton. The lead was sold in London at from £16 to £22 per ton, and the silver from 5s. 4½d. to 5s. 6d. per ounce.

Bismuth is represented by the Murninnie Mine, on the western coast of

Spencer's Gulf, and the Balhannah Mine, east of Adelaide. A considerable amount of work has been done on these properties. The ore from the first-mentioned mine is said to contain 18 to 79 per cent. of bismuth, and from 10 to 20 per cent. of copper, together with a little nickel, silver-lead, and cobalt.

In gold mining South Australia has not come well to the front, notwithstanding that she possesses a large area of auriferous country. Reefs in the Woodside district have turned out considerable amounts of gold, and the Alma Mine, in the Waukaringa district, has yielded well. Alluvial goldfields have been worked with more or less success at Echunga, Barossa, Para Wirra, and Ulooloo; but the latest, and up to the present time, the most productive alluvial workings, have been found on the Teetulpa run, in the north-east district. A detailed notice of these reefs and alluvial workings will be found under the heading of "Gold."

The mines that I have mentioned are well known and are easily found, and some of them are still being worked. But there are hundreds of others that have been opened under promising circumstances, and upon which much labour and money has been expended. These possess valuable ores, but have been abandoned owing to a variety of causes. Many have not been worked since the outbreak of the Victorian gold-diggings in 1851 drew away the bulk of the male population; and others have failed through mismanagement, want of funds, and reckless expenditure. As a rule the public rise quickly to mining-fever heat on the instant that good "prospects" have been found, or have been reported to have been found, in some particular district. The results of wonderful so-called assays are published, and success seems assured. A small amount of capital is subscribed, work is begun, and dividends are expected to be paid in an incredibly short space of time, before in fact the mine has been properly opened and tested. There are men who invest a few pounds in almost every fresh mining venture that is put before the public. A shaft is put down to a depth of 50ft. or 60ft., and gold is confidently expected to be at once struck in such quantities as shall not only relieve the investor of all further expenditure, but return him a dividend into the bargain. After the shaft is sunk the reef is perhaps cut at a spot where it is small, or carries little if any gold. Thereupon the work is abandoned; the reef is condemned as being worthless. Nothing can be more absurd than to draw conclusions such as these, from evidence, the nature of which is, so slight and unreliable. The work done is of the most perfunctory kind. It has not been sufficient to prove more than that the vein was barren at that one particular place. Unless driving as well as sinking on lodes and veins be carried out, it is impossible to test them. But as a rule the sinking of the shaft and the

driving of a level exhausts the courage and the capital of the ordinary investor, and in disgust he declares that the land is barren and worthless.

Considering the great number of inexperienced and un-moneyed men who engage in mining, it may be easily understood that the majority of mining ventures have proved to be commercial failures. And this applies not alone to South Australia. It is stated on authority that out of 500 or 600 lead mines in Great Britain, scarcely fifty are paying a profit; and out of 104 copper mines barely a dozen are payable; and out of the number of American mines introduced to the British public during the seven years ending 1881, all but one were failures, and the loss entailed amounted to £10,000,000.

Though far below this vast sum, the amount of money lost in mining ventures in this colony must be very large. Mining is an adventurous business at the best of times, and is suited to energetic and adventurous men only, who may have time and money, and who can afford to lose both with but little risk of the loss hurting them. It is unjustifiable for any one to invest in mines the sources of a scanty income, or capital that should properly be invested in his own business. If such persons lose their money they themselves are alone to blame.

But mining need not be such a risky business, and, if proper measures were taken, the proportion of unsuccessful mines might be greatly reduced. From the want of knowledge, mines are frequently opened in strata where little or no prospect of success is likely to attend the work. Promoters and managers of mines are frequently ignorant of the first principles that govern the accumulation of ore deposits. Then, again, mines fail often for want of capital, and this owing to the requirements and costs of the undertaking not having been carefully considered beforehand. Another cause of failure is that proper machinery for pumping is not provided for; another, the expenditure of money in trying to produce immediate surface results instead of sinking shafts; and yet another cause is, that of working on borrowed capital. In some mines of real worth, a sum of money has been paid away in interest that would have been sufficient to pay a small dividend on the capital actually necessary for establishing the mine. Many mines have been ruined by the enormous expense incurred in management by directors and secretaries living at a distance from the works, and not giving sufficient time to personal inspection, and also by the expenditure of money on unnecessary and costly buildings above ground. The present age demands a more intelligent class of mine captains, engineers, and miners, and the establishment of schools of mines becomes every year more necessary. The time has passed for mines to be managed by rule of thumb. No doubt there are numbers of men, all the

world over, who are intelligent and are well versed in the knowledge of the districts they have been accustomed to work in, but who are perfectly ignorant of the different conditions of ore deposits of other countries. Instances of unintelligent methods of working are common. Many men in this colony in sinking on a quartz vein are of opinion that if they only go deep enough they are certain to strike gold; they do not test the stone as they proceed, and therefore are ignorant as to whether it does or does not carry gold. In this way much labour and money is wasted. In some instances this may be done with a fraudulent purpose, miners leading a company to believe that their prospects are good, and thus securing to themselves so many months work and wages. The stone from the reef should be frequently tested. A common error in connection with alluvial diggings is, that of supposing that there must be a reef in the neighbourhood from which the gold has been derived. There is no doubt but that in many cases it has come from small veins or leaders scattered through the rock.

In reference to alluvial gold mining, it may be of interest to note the difference in the past and present fees charged for a licence or "miner's right." Up to the month of November, 1854, the fee was one pound ten shillings per month; it was then reduced to ten shillings per month; the present charge is five shillings a year. This authorises the holder to search and mine for gold upon any Crown lands.

In conclusion, I desire to thank Mr. H. P. Woodward (late Assistant Geologist), for notes furnished by him on many of the mines; and Mr. E. Davenport Cleland, who has ably assisted me in collecting and arranging the information contained in this mining record, and seeing it through the press. Having before acknowledged my indebtedness to the works of Professor Ulrich and Mr. J. B. Austin, nothing remains to be done but to thank the following gentlemen for the information they have placed at my disposal:—

Captain H. R. Hancock—Reports on the Moonta, Wallaroo, Kurilla, and other Mines.

Captain R. Cowling—Report on the Hamley Mine.

Captain W. H. Price—Reports on the Talisker and Wheal Margaret Mines.

Captain W. H. James—Report on the Blinman Mine.

Captain W. R. Morton—Report on the Kapunda Mine.

Captain H. Cock—Report on the Alma Mine.

Captain Jno. Warren—Report on the Eureka Mine.

Captain W. Pleitner—Report on the Mint Mine.

Mr. A. Caudan—Reports on the German Reef and Balhannah Mine.

Mr. J. C. F. Johnson, M.P.—Reports on the Bird-in-Hand Extended and the Woman in White Mines.

Chief Warden of Goldfields—Various reports.

Mr. F. C. Singleton—Report on the Aclare Mine, and other information.

Mr. W. L. Ware—Reports on the Prince Alfred, East Alma, Mid Alma, and Sebastopol Mines.

Mr. Thos. Gill—Books and Reports.

Mr. Thos. Young—Report on the Victory Mine.

Mr. John Butterworth—Report on Barritt's Mine.

Mr. W. S. Whitington—Books, &c.

Mr. E. F. Cooke—Information *re* the Blinman, Mount Rose, and Wheal Friendship Mines.

Mr. Gavin F. Gardner—Report on New Era Mine, &c.

Mr. A. H. Scarfe—Reports on Bird-in-Hand, Two-in-the-Bush, and Ridge Mines.

Mr. G. F. Hancock—Report on the Almanda Mine.

The Proprietors of *The South Australian Register*—For Books, &c.

Captain Hansford Ward—Report on the Murninnie Mine.

Mr. Jno. Harvey—Information respecting the Talisker and Wheal Ellen Mines.

Mr. W. D. Scott—Report on the Adelaide Mine.

Mr. J. R. Smith—Report on the Durdan Mine.

Mr. K. St. Barbe Miller—Report on Mount's Venture.

Mr. C. L. Dubois—Report on Mount Jagged Mine.

Mr. C. J. Coates—Information regarding the Burrawing Mine.

Mr. W. Green—Reports on Billeroo and Mount Gunson Mines.

HENRY Y. L. BROWN,

GOVERNMENT GEOLOGIST.

Adelaide, April 30th, 1887.

MINING RECORDS

OF

SOUTH AUSTRALIA.

COPPER.

ADELAIDE MINING COMPANY, formed in 1846. The property was situated twelve miles N.E. by E. of Adelaide, on section No. 5526, hundred of Onkaparinga, and near the Victoria gold mine. About seventy tons of ore were raised, samples of which were sent to England and the balance advertised for sale in the colony. The principal workings were on the spur of a hill in the N.E. corner of the section. The lodes formed a group of eight or nine, and, from what can be seen in the old workings, were nearly vertical, or having a very slight underlay to the westward. In some places the lodes seem to have come together and formed large bunches of quartz and copper ore. They bear S.W. and N.E., and vary in width from about 6in. to 6ft. In one or two places the excavations are from 12ft. to 20ft. wide. The ores consist of carbonates, and grey and yellow copper ore, associated in some instances with silver and gold. About four years ago, five tons of ore taken from a lode a little to the east of the old workings yielded 22½ per cent. of fine copper. In the old workings the metallic minerals are principally associated with quartz and gossan; while in other lodes, in addition to these, there is a large quantity of barytes. The country rock is chiefly slate, traversed by bands of hard rock. The depth and number of the shafts and drives is not known, as, for the most part, the works are inaccessible.

Noticable features in the workings are the great number of shallow drives, the number of parallel lodes that have been struck, and the fact that they all carried ore more or less near the surface. In 1851 the men abandoned the mine, and went to the Victorian diggings. Since then work has been done by a succession of tributors, and this probably accounts for the "tunnelling" together of the mine. The area of the old workings forms but a small portion of the Adelaide Mine section.

THE ALL NATIONS MINE is one of the Burra group, and was worked by a Melbourne company. No record of results. (1867.)

ANGASTON.—Previous to the year 1846 two copper lodes were discovered on a section close to Angaston and in the valley of the River Gawler. One of these lodes was traced for a distance of 200 yards, and from some samples of ore taken from it 33 per cent. of copper is said to have been obtained by assay. In common with many other localities in this colony, this district has the appearance of being rich in copper ore, but there is no evidence at hand to show if any attempt has been made to develop it.

ANSTEY'S MINE, near the sources of the Torrens, on the Highercombe property. No records. (1846.)

APEX HILL MINE, 176 miles N.N.E. of Port Augusta, is situated in rather rough

country and amongst steep hills. A lode running about N.E. and S.W. is traceable for about 150 yards on the surface. The back of the lode consists of ironstone, with quartz and copper ore. The country is quartz and clayslate. Several stains of copper are found in other places away from the lode; there are very strong green stains on the face of a precipitous rocky hill at one side of the creek, while the hill on the opposite side is covered with blue stains. The ore in the lode is not very rich, but looks promising, consisting of green and blue carbonate, with a little grey ore. It is impossible to say what it may prove in depth, the ground not having been opened at all. (Austin, 1863.)

APPEALINA.—Three miles N.E. of this place and west of Mount Carnarvon. A mineral licence was taken out by Thornbar and Hele. It was reported to contain a fairly defined lode of grey ore and green carbonates.

Another licence was taken out adjoining this one, but nothing has been reported concerning it. Very little work has been done here. A shaft 50ft. deep was sunk, and fine specimens of native copper were got. Dioptase, or silicate of copper, is found here. The surrounding country is marked by dark-blue flags and slates, with bands of hard blue rock, dense and compact, which dip south, 20° west, at an angle of 15° to 30°. The lode is accompanied by a dyke of hard breccia or conglomerate, with fragments of various rocks, and contains a great deal of iron pyrites. (1859.)

ARNO BAY or WINDITTIE COPPER MINE is four miles S.W. of Wangaraleednie station and about eighty miles N.E. of Port Lincoln. A shaft has been sunk to a depth of 100ft. No further records obtainable.

THE AUSTRALIAN MINING COMPANY was established in London, in1845. The subscribed capital was £400,000, in 20,000 shares of £20 each, of which (in 1847) £40,000 were paid up. Their principal properties are at Tungkillo, Reedy Creek, thirty-four miles north-easterly from Adelaide, and at Charlton, fourteen miles south of Mount Remarkable. (For mines, see CHARLTON and TUNGKILLO.)

THE BALHANNAH COPPER MINE.—(See under "GOLD").

THE BAROSSA COPPER MINE, was at one time the property of the Royal Mining Company. It is situated twenty-two miles N.E. of Adelaide. There is no record of work done upon it. (1856.)

THE BELTANA COPPER MINE was opened by a small company, who began to work the sections. They sent a few tons of ore away, but the smallness of the capital raised prevented the mines from being properly worked. The mine lies in a country of low ranges, about eighteen miles west of Beltana station, and half way between the southern end of the Mount Deception Range and Lake Torrens. The ore deposit is represented by a thin zone of soft arenaceous shales, impregnated with and enclosing small patches and nodular pieces of atacamite (chloride of copper). The deposit dips apparently at an angle of 20° to 25° northward, underneath a thick bed of hard limestone, forming the flat top of a low hill. The workings lie on the southern slope of this hill. They consist of four openings, two of which are mere shallow excavations, and the third an underlay shaft of about 16ft. deep, with a crossdrive. The fourth, also an underlay shaft of about 60ft. in depth. This underlays for the first 40ft. at an angle of 40°, and flatter for the remaining distance, the angle not being more than 25°. The shales exposed in this shaft are very soft, and full of streaks and concretionary masses of impure brown iron ore, which contains seams and cavities full of crystalline coatings of atacamite. Besides these, small patches and veins of gypsum occur, and large and small angular and irregular masses of cavernous quartz, the hollows of which are mostly occupied by atacamite in fine acicular crystals, associated occasionally with carbonate of lead. A lot of ore left on the ground is but of middling quality, but might be brought to a good percentage by dressing.

The prospects of this mine do not appear encouraging, nor do they appear to warrant any great expenditure. (Ulrich, 1872.)

THE BELVIDERE MINE is situated six miles N.W. of Hamilton, on the River Light, sixty miles from Adelaide. The mine is on the north end of Peters Hill, but has not been worked for many years. (1867.)

BEWLEY MINE.—West of Waukaringa. No records obtainable.

THE BILLEROO MINE lies about 125 miles E.N.E. of Port Augusta. There are six lodes—three parallel lodes, two crosscourses, and a "blow." The main lode bears N.E. and S.W., and is about 24ft. wide. Eighty tons of grey ore have been sent away of a percentage varying from 28 to 75. Three shafts have been sunk, the deepest of which is 120ft.; and a drive has been put in to a length of 20ft. In one place a face of ore was met with 5ft. wide, and containing 75 per cent. of metal. The veinstone consists of quartz and gossan, and the country rock of schistose slate. The mine was opened about fourteen years ago.

BLINMAN.—Respecting the discovery of this mine there is not, unfortunately, any written record. But it is supposed to have been found about the year 1862 by a shepherd named Blinman. His attention was drawn to the spot by a great outcrop of mineral on top of a hill, about 90ft. above a creek that lies to the eastward. This mass was about 350ft. in length, nearly 100ft. in thickness in one part, and of considerable height. On being tested it proved to be rich copper ore. Mr. J. B. Austin, in his "Mines of South Australia," says:—

The reef is composed of indurated clayslate, intermixed with ironstone and gossan, and formed the back of a lode running nearly north and south. In the clayslate small pieces of green carbonate and grey ore are found. On the rocks being broken away a fine lode of exceedingly rich ore was seen, 8ft. wide, and underlying westwards into the hill about 18in. in the fathom.

When Mr. Austin visited the mine the top of the hill was being stoped away, and a splendid course of ore was exposed to view. It was nearly solid ore for a width of 8ft., and had a peculiarly brilliant appearance, like a mixture of grey and red oxides. Some rich green and blue carbonates were occasionally met with, and specks of the finest yellow ore. The mine is 272 miles north of Adelaide, and about 120 miles east of Port Augusta; it is situated in the Flinders Range, and is at an elevation of 2,000ft. above the Parachilna plains.

Professor Geo. H. F. Ulrich, F.G.S., reporting upon this mine in 1872, says, speaking of the outcrop:—

The deposit, as a whole, is bounded on the east by bluish and mottled shaly slates, with a very steep eastward dip, which changes, however, at a short distance further east, to about 30°. The rock on the west side is not well exposed at the surface, but apparently consists of a calcareous, ferruginous, partly breccicated sandstone, striking north 25° east, and dipping westerly at an angle of about 60° at a short distance, north and close eastward of main stock; a great irregularity is apparent in the outcrops of the rocks of the country, calcareous shales and sandstones alternating * * * * The larger veins of ore traverse the stock mass at oblique, sometimes at nearly right angles, but innumerable smaller veins run intermediately and join the lower ones from all sides, whilst the stone between is more or less strongly impregnated with ore. At 40 fathoms in depth, sulphide ore (copper pyrites) makes its first appearance, and increases in quantity down to the water-level at 50 fathoms, where, in the bottom of a large pit, south of engine shaft, a fine vein of rather friable, but nearly pure copper pyrites was struck, that runs nearly east and west, and is from 1ft. to 3ft. in thickness. In this portion of the mine the deposit * * * looks undoubtedly richer in ore than nearer the surface, the impregnation and veins of copper pyrites through the matrix reaching perhaps 20 to 25 per cent.

Besides the minerals already mentioned the following occur in the deposit:—Azurite (blue carbonate of copper) rarely, in small specks near the surface; reddish and black cupriferous brown iron ore, in veins and patches; a black and muddy sulphide, coating copper pyrites; very little iron pyrites; galena, in small specks; heavy spar (sulphate of baryta), in nests and irregular veins, often finely crystallised; white calcite, in thin veins and nests; aragonite, in fine druses of needle-shaped crystals; quartz, in thin seams and small patches. On the slope of the hill, in close proximity to the deposit, the rocks also enclose small nests of micaceous iron ore.

Below the water level a vein of bisulphuret ore was struck, finely disseminated through magnesian limestone. The depth of the shaft, at the present time, is 70 fathoms. The ores obtained from the mine, from the surface of the 45-fathom level

were azurite and chalcocite, and from this level to the deepest point, chalcopyrite prevailed—pure iron pyrites being almost absent. At the 70-fathom level a series of vughs were discovered.

The mineral products were, native copper in crystals and finely disseminated, also crystals of cuprite and melaconite. Besides showing an increase of mineral properties, the temperature of the water decidedly increased; but, owing to the breaking in of a quantity of water, the examination of this portion of the mine had to be abandoned. The lode at this level is clearly defined, averaging 21ft. in width, and yielding 3 to 4 tons of 25 per cent. chalcopyrite to the cubic fathom for the whole distance opened out. (W. Hy. James, 1886.)

Mr. E. F. Cooke informs me that in this mine there is but one lode, running north and south, with cross courses. The underlay is nearly perpendicular down to the 50-fathom level, and from there as far as the 70-fathom level it would be about 1 in 5.

The width of the lode ranges from 14ft. to 18ft. In the sulphurets leaders of solid ore gave about 28 per cent. of metal. The whole of the lode was full of veins of ore averaging from 2 to 5 per cent., and capable of being dressed up to 25 per cent. The water level was slightly below the 50 fathom level. Drives to the length of 35 fathoms have been put into the carbonates on either side of the engine shaft. In sinking a winze below the 60-fathom level to meet the 70-fathom one, an immense vugh was discovered filled with water. The ore around this remarkable place is a rich sulphuret, and is coated with black oxide.

During the period when the mine was being worked by the E. & A. Copper Co., viz., from 1882 to 1885, ore to the extent of 1,860 tons was smelted.

The Bon Accord Copper Mine adjoins the property of the Burra Mine, and it was owing to this that the ground was originally taken up. Although the indications of copper were slight, a large sum of money was spent, and a considerable amount of work was done. The engine shaft was sunk to a depth of 50 fathoms; other shafts were sunk and drives were put in. Some of the piles of stuff that had been raised were impregnated with particles of ore, amongst which may be detected red oxide and black ore. (Austin, 1883.)

Boolcoomatta Mine, forty-two miles N.E. of Mannahill. There are four or five shafts, and many open cuttings in quartzite, mica schist, sandstone, slate, and granite, all more or less stained with copper. As far as can be judged no defined lode has been found. The mine has been long abandoned. (1885.)

The Breadalbane Mining Company was established 1850; 3,000 shares, £5 each. The property comprised five sections, and adjoined the property of the Strathalbyn Mining Company. Stopped work, 1851. No records.

The Bremer Copper Mine is situated thirty-six miles S.E. of Adelaide, and takes its name from the Bremer, a creek that flows into the Murray. From the township of Callington it is about three and one-half miles distant, and the mine is frequently called by the name of the township.

The mine was discovered in 1850, and was worked for several years. The surrounding country is flat, composed of clayslate, micaceous schist, and occasionally a little quartz. Referring to Mr. J. B. Austin's book, the ores in this mine are sulphurets, considered to be of good average quality. The prevailing ore is yellow sulphide, with some black oxide; peacock ore is also found. The copper smelted at the works adjoining, during the time the mine was being worked, was of the quality of 96 per cent. of pure copper, notwithstanding that the refining process was omitted. This mine was a part of the property of the Britannia Mining Company.

The Britannia Mining Company was established in 1849; capital £40,000, in 8,000 shares of £5 each. They held 7,000 acres of land, mineral special survey on the Bremer. The operations of the company were confined to leasing setts of its

land for mining purposes. In 1852 they had nine mines in active operation on this property, viz., the Wheal Friendship, the Wheal Maria, the Wheal Prosper, the Bremer, the Tresevean, the Menkoo, and three others.

THE BROUGHTON COPPER MINE is situated on the Broughton River, and is distant from the Burra twenty-five miles in a direction west of north. The indications here were very promising, and some rich ore was obtained, but the country was so hard that it was found it would not pay for working, and after a few months the mine was abandoned. (Austin, 1863.)

THE BURRA BURRA MINE was found in 1845 by a shepherd named Pickett. It is about 100 miles from Adelaide, a little to the east of north. It is situated on bald hills standing 130ft. above the surrounding country. The prevailing rock of the surrounding formation is limestone. The ores obtained from this mine have been chiefly red oxides, very rich blue and green carbonates, including malachite. Native copper has also been found. (Austin, 1863.)

The discovery of this mine marked a new era in the history of the colony, supporting, as it did at one time, a large population. The capital invested in it was £12,320 in £5 shares, and no subsequent call was ever made upon the shareholders. The total amount paid in dividends was £800,000. After being worked by the original owners for some years the mine was sold to a new company, but during the last few years it has not been worked, owing in some degree to the low price of copper and also to the fact that the deposit then being worked became exhausted. For many years the average yield was from 10,000 to 13,000 tons of ore, averaging 22 to 23 per cent. of copper.

In Mr. Conigrave's "Handbook of South Australia" it is stated that, during the twenty-nine and a half years in which the mine was worked, the company expended £2,241,167 in general expenses. The output of ore during the same period amounted to 234,648 tons, equal to 51,622 tons of copper. This, at the average price of copper, amounted to a money value of £4,749,224. The mine stopped working in 1877.

At one time—in 1859—the number of men employed was 1,170. In the deeper levels regular lodes are met with, running north and south, containing very rich ore of malachite, red oxide, and grey sulphuret of copper; but above the 30-fathom level there is no appearance of lodes, the ores (malachite and carbonate) being deposited with the greatest irregularity. The blue carbonate often occurred in round nodules, with crystals of the greatest regularity projecting from the surface. The malachite was found in the form of stalactite, in slabs incrusting fissures and irregularly-shaped masses, which had been deposited in cavities of the rocks.

The country rocks are much broken and twisted, and consist of cherty silicious rocks, crystalline white and grey limestone, blue slaty shales, and argillaceous sandstone.

THE BURRAWING MINE is situated near Tumby Bay, on the west coast of Spencer's Gulf. It was opened about the year 1871, and was wound up in 1874. A good deal of work was done upon it, and ore to the value of £6,338 was sold. The money expended on the property amounted to over £30,000. Assays of ore varied from 17 per cent. of fine copper, up to 37 per cent., and bismuth was present in the proportion of about 1½ per cent. Owing to the captain's reports not being available, it is impossible to give the depth of the shafts, or the length of the drives.

No work of any consequence has been done in the mine since 1874.

CHAPPEL'S LODE, near the Yudnamutana Mine, is a gossan lode with copper, in silicious limestone, with green actinolite and greenstone, strike W. 10° S. The arenaceous limestone extends for some distance, and other limestone bars are visible. This lode is well defined, but has not been worked. (July, 1884.)

CHARLTON COPPER MINE, the property of the Australian Mining Company, is situated on the Rocky River, and is fourteen miles S.E. of Mount Remarkable.

£20,000 is said to have been spent on this property without any return. The mine was not being worked when Mr. A. R. C. Selwyn, Victorian Government Geologist, visited the district in 1859. He described the ore seen in the spoil heaps as consisting almost entirely of small nodular lumps of impure blue carbonate, embedded in a rough white rock, chiefly composed of decomposed feldspar with grains of quartz and a little mica. Several shafts were sunk.

Constitution Hill Copper Mine lies about four miles south of Mount Serle. It consists of two outcrops of ore, which show on the northern slope of a low rise within about half a mile N.W. of the terminating point of a high spur connected with Constitution Hill. The first and most important outcrop represents a lode-like mass of a dense, brittle quartzite, which is thickly traversed in all directions by larger and smaller quartz veins, most of them, however, running in the strike of the mass. Both quartzite and vein quartz are full of small green patches, seams and coatings of atacamite (chloride of copper), and there are scattered larger vein-like masses and patches, which show within an earthy atacamite envelope, nuclei of dark grey oxide of copper, generally associated with calcite. This dark grey oxide is very seldom pure oxide, but contains a variable percentage of sulphide of copper, and it is from the decomposition of this ore that it has most probably arisen.

The outcrop extends for about six chains in length, showing a strike of N. 35° E., and apparently dipping steeply to the S.E. Its thickness is about 15ft.

The second outcrop of copper ore lies about one and a half chains eastward of the first, to which it shows great resemblance in mineral character. It is only from 1ft. to 2ft. thick, and is traceable on the surface for about one chain in length.

The country between the two ore outcrops, and for some distance both east and west, consists of argillaceous friable mudslates, which show between the outcrops a strike of N. 23° E., and dip easterly at a very flat angle; further east this strike is E. 35° N., with a south-easterly dip of 40°. West of the large quartz reef, more especially on top of the hill, the slates are traversed by quartz and ironstone or gossan reefs, in great abundance, and large blocks of brecciated brown iron ore appear scattered over the surface. (Ulrich, 1872.)

Constitution Hill Copper Mine West lies about one and a half miles west of the hill. The ore indications occur in a lode of hard yellowish and reddish white flinty limestone, and consist of thin veins and coatings of malachite and scattered specks of greyish oxide of copper. The lode is from 3ft. to 4ft. thick, and strikes W. 20° N., with dip apparently steep to the northwards. The country which the lode traverses consists of fissile purple slates, showing false bedding, and striking nearly due east and west, with a northward dip of about 60°. These are succeeded, at six chains southward, by grey calcareous slates. (Ulrich, 1872.)

Copperer Mine is situated about six miles inland from Tumby Bay, on the western shore of Spencer's Gulf. There is no record of the work done. (1859.)

Crinnis Copper Mine is in the Angaston district. The lode is of an exceedingly interesting character. In the heaps of "spoil" that had been thrown out, there were found specimens of native copper, blue and green carbonates, red oxides, sulphurets, and copper pyrites, also micaceous and magnetic iron ore, carbonate of iron, calcedony, opal, and white crystalline limestone. The vein has an irregular N.E. and S.W. strike. (Selwyn, 1859.)

Cumberland Mine belongs to the Wallaroo group, on Yorke's Peninsula. What appeared to be a fine lode was found on the surface, but proved to be a blow only, and ran out in about three fathoms. Some fine galena was also met with in a similar way. Three shafts were sunk, one to the depth of 27 fathoms, and many fathoms of drives and costeening were cut, but the lode could not be found, and the mine was abandoned. (Austin, 1863.)

CURRAMULKA MINE, in the hundred of Curramulka, Yorke's Peninsula, fifty-six miles west of Adelaide. There are traces of copper ore in calc spar, in the blue crystalline limestone. There is no appearance of a lode, and nothing to warrant the sinking of a shaft. (1884.)

CURRENCY CREEK SPECIAL SURVEY.—A copper lode intersected the township lands, and specimens of blue and green carbonate brought from there to Adelaide, created much sensation at the time. (1848.)

THE DAISY COPPER MINE, near the Yudnamutana mines, contains two lodes, one of which is about 4ft. wide, and traceable for eighty yards along the surface, carrying grey and red oxide and green carbonate in fine gossan. (Austin, 1863.)

THE DALY COPPER MINE lies about five and a half miles E.N.E. of the Yudnamutana mines, and the country to the south and westward is, if anything, more broken, rocky, and wildly romantic than that in the neighbourhood of the Yudnamutana. The workings, such as they are, are opened in a very strong mass of quartzite that runs at a strike of about N. 45° W. up the steep slope and along the top of a range which rises to a height of about 200ft. above a creek lying to the S.W. The ore is of a very good percentage, and consists of earthy, and sometimes crystallised, malachite and azurite, interspersed with patches and seams of red and grey oxides of copper. The quartzite is generally much fractured, rather brittle, and full of argillaceous veins, only in some places, where the latter disappear, it is very hard and tough, and traversed by veins of quartz, often finely crystallised and enclosing scales of micaceous iron ore. It extends, with two short breaks occupied by earthy conglomeratic shales, for about twenty-five chains in length, and shows abundant copper stains nearly all the way. As regards the rocks of the district they are of metamorphic character, presenting mica schist, hornblende schist, satiny and spotted slates, all of the same varieties as observed near the Yudnamutana Mine. (Ulrich, 1872).

DAVISON'S CLAIM lies about two and a half miles from the Blinman Mine. It contains good indications reaching from the gully to some distance up the hill. A lode of ore of fair quality was discovered by sinking a shallow pit at the bottom of the hill, and in two or three other places ore was found. (Austin, 1863.)

DEPÔT CREEK COPPER MINE is situated about twelve miles from Mount Rose and near Eyre's depôt. The general character of the lodes here is favourable to the production of copper ores of good quality. The lodes contain green carbonate of copper, grey ores, and red oxide. (1860-9.)

THE DEVON CONSOLS is in the Wallaroo district. No records obtainable.

THE DOORA COPPER MINE is in the Wallaroo district. No records obtainable.

THE DURYEA COPPER MINE lies about one mile south of the Wallaroo mines. It contained a great deal of ore, but it required treating by some cheap process for separating the ore before it was fit for market. At 12, 22, and 32 fathoms crosscuts and levels were driven, and two regular lodes were found running nearly east and west, and underlying nearly 18in. in the fathom. A large amount of mundic was met with in the lodes. In the 32-fathom level a good course of rich yellow and black ore was found, and here the two lodes seem to have run together. There is a good deal of black ore in veins through the mine, and some small branches of ore; but in several places the ore has been thrown out by patches of unproductive ground. (Austin, 1863). More extended workings proved this mine to be unremunerative.

DUTTON'S MINE, eighty-two miles north of Adelaide, adjoins the Princess Royal Mine on the south. No work has been done since 1851.

ELATINA MINE.—South-west of Mount Emily. No records obtainable.

EMU FLAT COPPER MINE is south-west of the township of Clare; here the vein is a mixture of quartz, carbonate of lime, and sulphate of baryta, in grey, white, and brown slate, and hard white calcareous and silicious rock, and the ore, impure green and blue carbonates, mixed with sulphurets of copper and iron. Not much work has been done on it. (Selwyn, 1859.)

THE ENTERPRISE MINING COMPANY held various sections on lease and freehold. Amongst others they had section 5535, on the Sixth Creek; section 5607, on the Torrens; and section 267, adjoining Wheal Gawler Silver-Lead Mine. On the Sixth Creek section, ores were found comprising red oxide containing specks of virgin copper, grey copper, black oxide, and occasionally traces of blue and green carbonate. The company began operations in the spring of 1847; the capital was £3,000 in 1,000 shares of £3 each, £1 per share deposited. A call of £1 per share was made in January, 1848.

FLAXMAN'S VALLEY MINE.—Thirty-eight miles N.E. of Adelaide. No records obtainable.

THE FLINDERS MINE, one of the Burra mines, was worked by a Melbourne company. No records obtainable.

THE FLINDERS COPPER MINE is two miles north of Tumby Bay, Spencer's Gulf. No record of workings obtainable.

GAMMON CREEK MINE.—The lode is a well-defined one, showing on the surface for about three chains in length for an average width of 4ft. Specimens sent to Adelaide contained grey sulphides. (1860-9.)

THE GLENALBYN MINING COMPANY.—Established 1850. 2,000 shares £5 each. This property comprised of four sections, situated about one mile to the N.W. of the township of Strathalbyn. Stopped work 1851. No records obtainable.

THE GORGE COPPER MINE, two miles south of Normanville, is on the face of a steep hill rising almost abruptly from a flat half a mile from the sea. The lode runs N.N.E., and is traceable for above 250 yards. On the surface it is composed of a quartzose rock strongly stained and impregnated with blue and green carbonate of copper, and contains thin veins of ore. (Austin, 1863.)

GOW'S COPPER MINE is four miles east of Mingary, near the New South Wales border. At the time of my visit (1885) three or four excavations had been made to a depth of from 6ft. to 12ft., at considerable distances apart, along the course of the lode. The depths of the holes were not sufficient to test it. Mr. Gow stated that assays of two or three samples of the earthy material from the lode had yielded silver at the rate of 12oz. to the ton. The strike is N.N.E., and in that direction the lode can be traced for a distance of half a mile.

GRAND JUNCTION MINE, forty-five miles N.E. of Adelaide. No records obtainable. (1867.)

THE GREAT BRADFORD MINE, four and a half miles from Finniss Flat, County of Hindmarsh, has been abandoned for many years. No records obtainable.

THE GREAT GLADSTONE COPPER MINE is situated thirty-two miles easterly from Port Augusta, on the slopes of low hills lying to the eastward of Mount Brown. The country consists of clayslate and quartz. Several outcroppings of ore, and copper stains, are found in many places. The backs of the lodes consist chiefly of ironstone,

and a considerable quantity of iron was found in most of the ore raised. There are, however, some fine specimens of rich copper ore, grey oxide and brown ore, besides green carbonates and a little malachite. Small particles of galena were also met with. Three shafts were sunk, varying from 8 to 17 fathoms in depth, and drives were put in for some distance. This mine is rich in specimens for the cabinet, the crystals of quartz stained with copper and other metals being very beautiful. (Austin, 1863.)

THE GREAT WHEAL ORFORD MINE, better known as the "Old Reedy Creek Mine," is comprised in the property of the Australian Mining Company at Tungkillo. There were several lodes, and the work done on one or two of them was extensive. One shaft was sunk to a depth of from 40 to 50 fathoms, and an adit was driven to a distance of 300 fathoms. The 10, 20, and 30 fathom levels were also driven to considerable distances. The lodes were from 2ft. to 8ft. wide, and contained green carbonates and grey ore.

GREENOCK CREEK MINE, distant thirty-four miles from Adelaide. Indications were considered good. Work suspended in 1851.

THE GRUNTHAL COPPER MINE. (*See* under "GOLD.")

GUM WELL, about 56 miles east of Petersburg. Two miles west of Gum Well station there is an old mine. The workings are an open cutting, 30 yards in length, and 10ft. deep, and a shaft about 40ft. deep. In the cutting a quartz and ironstone reef is disclosed, carrying copper ore. The strike of the reef is E.N.E. The rocks are black and bluish calcareous slates, and fine-grained slaty sandstone and limestone. (1885.)

HALLETT'S MINE, within two miles of Reynella. Has not been worked for many years past. No records obtainable. (1867.)

THE HAMLEY MINE belongs to the Moonta group on Yorke's Peninsula. There are six lodes running in a westerly direction and underlaying 3ft. per fathom, and bearing 12° E. of N. Their average width is 3ft., and the ores they contain are chiefly yellow and purple. The veinstone associated with the metallic minerals is quartz and feldspar, and the country rock is hard and close. The quantity of ore raised (February, 1887) equals 41,814 tons of the value of £333,739, and the average percentage of copper is 20 per cent. Nine shafts have been sank, the deepest of which is 153 fathoms. The ore occurs in a regular defined lode with occasional bunches. (1887.)

THE HOME MINE, or strictly speaking the Home Shaft, is one of many shafts in the Wallaroo mines, Yorke's Peninsula. It is a short distance north-west of the Matta Matta Mine, and near to the town of Kadina. Other shafts in the immediate neighbourhood, are the Wombat, Taylor's, Young's, and Hughes'. These are sunk upon the same lode, running east and west, at considerable intervals apart. In Hughes' shaft, at the 40-fathom level, a drive has been carried east on a splendid course of solid ore, 8ft. in width. The prevailing nature of the ore in this mine is yellow sulphuret, but a variety of ore has been met with in the course of the workings, namely, red and grey oxides, carbonates and muriates, and a little malleable copper. The average quality from these mines does not exceed probably 15 per cent., but the quantity is enormous. (Austin, 1863.)

HORSESHOE, ONKAPARINGA.—No records obtainable.

THE JOHN BULL MINE, or COCKING'S WARIOOTA, is close to the original Warioota Mine, which is situated about ten miles S.W. of the township of Beltana. The original finders, four working miners, worked on these claims for twelve months,

without the aid of machinery. The lode, as it appeared on the surface, was almost flat. About 50 tons of ore were tried, and gave nearly 45 per cent. without dressing. (1860-9.)

THE KANMANTOO MINE, thirty-three miles S.E. of Adelaide. It is the property of the South Australian Company, and was worked by them for some years. It was found, however, that the expenses were greater than the profits, and work ceased. Since then work has been done by small local companies at different times, but in no case at a profit. The mine has now lain idle for some years past.

Mr. J. B. Austin, writing of this mine in 1863, says:—

The principal lodes are the Kangaroo, Emily's, and the Boundary lode. The two first run north and south, and the latter is a counter lode. The first lode yielded yellow ore of a moderate percentage. Emily's lode gave large quantities of yellow ore, which at the 10-fathom level gave place to red oxide and native copper. Two levels have been driven on the lode at 16 and 26 fathoms respectively. The copper produced at the smelting works from the ore now being raised amounts to about twelve tons per month. A great amount of work has been done at this mine since its commencement. The South Australian Company raised about 4,000 tons of ore, and opened a large extent of ground. Mr. W. B. Dawes, the subsequent lessee, raised about 1,900 tons. Smelting works were built in the neighborhood of Scott's Creek, and consisted of a calcining, a reverberatory, and a refining furnace, and other necessary buildings.

THE KANMANTOO MINE WEST is a short distance from the other, on an adjoining section, but no great amount of work was done upon it, nor have any special results been recorded as having been obtained. Some good carbonates were obtained in one part of the mine. (Austin, 1863.)

THE KANNAPPA MINE lies thirty-seven miles E.N.E. of Adelaide. A lode was cut in the 20-fathom level, and seemed to be of a very good character. No further records obtainable. (1867.)

THE KANYAKA MINE is fifty-seven miles in a N.N.E. direction from Port Augusta. The country consists chiefly of pipeclay, decomposed slate, and soft sandstone. There is a very well defined lode, having near the surface the appearance of indurated clay, strongly stained with copper, and containing occasional stones of ore of fair average percentage. The lode is from 2ft. to 30in. in width, but is rather flat, dipping from the horizon only about 2ft. in the fathom. A great deal of gypsum is found at the sides of the lode. Several shafts have been sunk (1863), the deepest of which is 15 fathoms, and these are connected by drives extending for about 40 fathoms. (Austin, 1863.)

THE KAPUNDA MINE is the oldest copper mine in South Australia, having been discovered in 1842, by Mr. Francis S. Dutton and Mr. Charles Samuel Bagot. The workings are on hilly ground of moderate elevation. The first ore was raised at the Kapunda Mine on January 8th, 1844; and on the 23rd of the same month, five dray loads were dispatched to Adelaide. The news of the discovery of this new source of wealth to the colony caused great excitement in the city, and had the effect of stimulating the search for minerals in all directions. In the Kapunda Mine there are four lodes, of widths varying from 4ft. to 6in. Main lode is the chief one, and is intersected by Cox's lode at an angle of 25°; Hart's lode crossed both Main and Cox's, and it was here that the richest deposits of ore were discovered.

The direction of the lodes is 25° east of north, and the underlay as a rule is 2ft. in the fathom. Associated with the metallic minerals is a run of blue decomposed slate on the east and north, red soapstone on the west, and on the N.W. a hard dark rock which dips towards the south, and though seen on the surface is not again met with until a depth of 75 fathoms is reached.

The proportion of metal to the ton is about 18½ per cent.

There are eight shafts, comprising two of 75 fathoms, one of 35 fathoms, and five ranging from 14 to 25 fathoms. The water level is 8 fathoms below the surface.

On the 14th June, 1879, the mine was sold under liquidation, and from that date to within the last few months (May, 1886) has been worked by tributors. The ore raised by them is valued at about £9,000. Unfortunately, information regarding the total quantity of ore raised has not been available, but in Harcus' "South Australia," 1876, an article from the pen of Mr. J. B. Austin gives the quantity raised, from the time of the opening of the mine until it was sold, as averaging 2,000 tons per year. At the 75-fathom level an exceedingly rich lode of from 2ft. to 3ft. in width was found, consisting of yellow sulphide of copper, said to be equal to 24 per cent. Mr. Alfred R. C. Selwyn, Government Geologist of Victoria, who visited the Kapunda mines in 1859, remarks:—

The mines are worked in a very peculiar soft aluminous rock of various colors—from pure white passing into pink and red, grey and blue. Frequently it is either covered with spots or traversed at right angles to the beds by thin veins or streaks of a pure white soft mineral, probably silicate of alumina. The galleries are all driven with pickaxe and spade, the rock seldom being hard enough to render the use of powder necessary.

The general dip of the beds near Kapunda is west 10° to 20° south. The veins, of which there are several running in parallel lines, north by east, and south by west, have also a westerly underlay from 25° to 50°. To the N.E. they all terminated abruptly in a soft dark-blue pyritous slate, which runs N.E. and S.W., dipping to the N.W., from 25° to 70°. On their southern strike the veins are are all intersected by a series of nearly east and west faults, throwing them to the eastward in steps.

The ores, blue and green carbonates, and red and black oxides, and native copper, seem to occur in very irregular veins and patches occasionally in the planes of the bedding.

The Karkarilla Mine belongs to the Yorke's Peninsula group, and is south of the Moonta Mine. The ores were not of a very high-class character. (1867.)

The Karkulto Mine is situated between Kapunda and the Burra, and is about thirty-five miles from the first-named township. This mine is chiefly remarkable from the fact that, though the indications of copper were considered extremely good. very little copper was obtained. Large and regular lodes were found; the walls were well defined, but the ironstone and gossan in them did not, as was hoped, give place to copper. (Austin, 1863.)

Ketchowla, Pandappa Dam.—N.E. District. There was a show of copper on the surface at this place, and a fair amount of work was done to prove the lode. But as the prospects were not promising the mine was abandoned. Galena is said to be found in the neighbourhood.

The Kingston Mine, seven miles N.E. of Kooringa. Some stones of ore, oxide of copper, and silver-lead have been found on the property. No further record obtainable. (1867.)

The Kirwan Mine lies four miles south of Mount Craig and seventy-two miles N.E. of Port Augusta, at the foot of a range of hills sloping towards a plain to the westward. The country consists of a light soft killas and a kind of pipeclay. There are several lodes and bunches of ore on the property, running generally to the east of north, and underlying from 18in. to 2ft. in the fathom. Three shafts have been sunk, and at the bottom of the deepest, 21 fathoms, there is a lode between 3ft. and 4ft. wide, composed of quartz and copper pyrites. In a crosscut, driven to the S.E., a lode of fine blue and green carbonates, about a foot wide, was cut. A short distance to the west two shafts were sunk on the course of the lode, which is composed of carbonates of copper intermixed with ironstone, and is traceable for 300 yards. On another section, about a mile and a half S.E. of the Kirwan, a small shaft was sunk on a lode running east and west, and which produced some fine grey and red oxide. The country on the Kirwan Mine differs somewhat from that on either side, and would seem to be a band of more favourable strata for copper. (Austin, 1863.)

The Kurilla Mine lies a little to the S.W. of the Wallaroo mines. It contains three lodes underlaying north, with an east and west bearing, and having an underlay ranging from 1ft. 8in. to 2ft. 3in. in the fathom. The width of the lodes varies

from 1ft. to 9ft., and the ore they contain is chiefly chalcopyrite. Sometimes, indeed, it is pure chalcopyrite, but, in other instances, it contains from 3 to 15 per cent. of copper. The veinstone associated with the metallic minerals is iron pyrites, portions of bedrock, &c., while the country rock is talcose schist. Twenty-six shafts, including the trial shafts, have been sunk, the deepest of which is 498ft. The length of drives put in at various levels equals three and one-sixth miles. The water level was reached at 30ft. The deposits of copper ore are chiefly along the lead of the lodes, associated with "gangue," the present supplies being mostly chalcopyrite.

In many ways this mine is similar to the Wallaroo mines, the chief difference being that the veinstone is not so mixed with "gangue," so that the chalcopyrite is of a higher percentage. Accurate information with regard to the total amount of ore raised, and its money value, has not been obtainable. But, during the ten years from 1874 to 1884, the ore sold from this mine equalled 19,397 tons, of the value of £155,068. Of the ore raised prior to 1874, no record has been kept; and, of that obtained since 1884, it is probable that at least 1,000 tons has been sold to the value of £5,000. (1886.)

Lake Torrens Mine is adjacent to the Beltana Mine, on the Western Plains. It was originally taken out by resident squatters, and held by them for several years. The lode is said to show on the surface for a distance of 600 yards, and its back to be 6ft. wide in some places, of good copper ore. (1860-9.)

Leigh's Creek Mine.—Four miles east of Mount Coffin. There are two, north and south, lodes. The lode is calcite, quartz, and gossan, with a dip 45° east, alternating with slate, dip west; strike E. 20° S. The ores are blue and green carbonates. Two shafts have been sunk to a depth of 80ft. to 100ft. Another mine is situated about two miles S.E. of Leigh's Creek railway station, from which some copper ore has been obtained. Green carbonate exists in small veins, colouring a white argillaceous sandstone. Associated with this are reefs of iron ore and silicious rock. (1884.)

Lyndoch Valley.—The Enterprise Mining Co. held a twenty-one years' lease of two sections in this valley. No record of work done.

Magill.—A mine was opened near this place in 1846. No record of work done.

Malone's Mine is about eight miles from Watt's Sugar Loaf, and eleven miles from the township of Kanyaka. A lode containing stains of copper was found on the surface, and on sinking some good ore was met with, containing gossan. (Austin, 1863.)

The Mallee Hut Claim is about sixteen miles south of the Blinman Mine, and about six miles south of west of Mount Emily. A lode opened in a creek showed good walls, with killas and flucan and fine gossan in the lode, and a fair amount of green carbonate of copper and yellow ore. The lode is nearly perpendicular, and 18in. wide. A small shaft was sunk, but the mine was ultimately abandoned. (Austin, 1863.)

The Matta Matta Mine, Wallaroo, Yorke's Peninsula. Two shafts were sunk to depths of 20 fathoms. A fine lode of ore, running about E.S.E. and N.W. was cut at the 10-fathom level. It contained green carbonate and grey sulphuret, with red oxide and a quantity of malleable copper. (Austin, 1863.) The mine was worked as a separate property for a short space of time subsequent to the beginning of the mining industry on the Peninsula. The operations of the proprietors were, however, suspended, owing to the influx of water; and ultimately the mine was included in the property of the Wallaroo mines.

McConville's Mine is about six miles south from Kanyaka, amongst low bald hills. There is a lode on the surface, running about 300 yards north and south, and about 18in. thick. The ore, which is mixed with gossan and feldspar, is not continuous, but occurs in patches. It is a rich sulphuret of a dark-greenish-grey colour. A shaft was sunk on the lode to the depth of about three and a half fathoms, and a drive was then carried for five fathoms, copper ore being found throughout. (Austin, 1863.)

Menkoo Mining Company.—A lease from the Britannia Mining Company, Bremer; 1,500 shares at £5 each. Stopped in 1851. No records.

Mimburra Mine, west of Waukaringa. No records obtainable.

Mochatoona Mine, twenty-seven miles N.N.E. of the Blinman, was at one time considered to be a wonderful discovery. A number of men were employed there for some time, but, owing to mismanagement, the mine was eventually abandoned. (1860-9.)

The Monster Lode Property is near the Wheal Ellen Mine, about three miles from the town of Strathalbyn. It consists of several mining sections, upon which a few miners worked for some months on tribute. (Austin, 1863.)

The Montacute Mine is one of the oldest in the colony, having been discovered in 1843-4. It is on the Mount Lofty Range, and about ten miles nearly N.E. from Adelaide. The mine is on a steep spur of the range, and extensive out-croppings of ore were visible on the surface. The ores were chiefly yellow and peacock ores, averaging 18 per cent. Some native copper was also found. (Austin, 1863.)

In 1848 it appears that the quantity of ore raised was about 1,500 tons; the quantity shipped about 1,000 tons, and the highest price realised in Swansea about £18 per ton. In 1846 the Customs returns give 503 tons of ore exported from this mine. Work was stopped by the discovery of the Victorian goldfields in 1851. (See this mine under "Gold.")

Moolooloo Mine, twenty-eight miles N.N.E. of the Blinman. It was tested by a company, but the ores were not sufficiently rich to pay expenses incurred of cartage to smelting works, thirty miles. Reports mention that on the hill is a "boil" capped with iron and manganese, showing good ore in several places. Very little work done. (1860-9.)

Moolooloo Mine South, of the same description as the Moolooloo Mine proper. (1860-9.)

The Moonta Mine and Wallaroo Mines were discovered about the year 1863-4, and are the richest copper mines in the colony. They are situated on Yorke's Peninsula on the eastern shore of Spencer's Gulf.

There are five main lodes on the property, and from each of these, various spurs and minor lodes branch out, and are connected with the main lode by occasional cross veins. Including these there are twenty-seven lodes. Their direction is north-westerly, and their underlay varies from 3ft. to 6ft. in the fathom. The main lode bears N. 20° E., and the others vary from that up to N. 45° E. The width ranges from 6in. to 20ft., and the ore obtained from the lodes in the present workings is chiefly chalcopyrite and occasionally bornite. The bulk of the veinstone—chiefly quartz and at times portion of the bedrock—as raised ore and "gangue" gives from 2 to 5 per cent. of copper, but sometimes clear chalcopyrite gives 20 to 30 per cent., and bornite from 30 to 50 per cent. The country rock is felsite porphyry, orthoclase porphyry, a special variety.

The quantity of ore raised from the mine from the commencement to the 30th

June, 1886, equalled in gross tons of 21 cwt. 476,180 tons, and the average percentage of copper on net dry weight of dressed ore equaled 20 per cent.

The total value of the copper, in the colony, up to June 30th, 1886, amounted to £4,579,097. Seventy-seven shafts have been sunk, including twenty-one trial shafts. The deepest shaft is 255 fathoms (1,530ft.), and the drives measure twenty-seven and a half miles. The water level was reached at about five fathoms.

The deposits of copper ore are chiefly along the lead of the lodes associated with "gangue," the present supplies being mostly chalcopyrite and occasionally bornite. An exceedingly small proportion of green carbonate ore was formerly found close to the surface; but a large proportion of the green ore was atacamite, and this was generally met with below the other. Sometimes red oxide was found with the atacamite. This deposit did not extend to more than a few inches, or occasionally a few feet from the surface.

The pecularity of this cupriferous district was disclosed by the removal of these ores, and the sinking of the shafts; and was—that although the lodes continued regular, no further ore was met with, and, as a rule no stain of copper was seen until the depth of from five to ten fathoms was reached, when rich oxides and malleable copper deposits were struck, and after that black and grey sulphides. These deposits, however, were chiefly worked out in past times. Chalcopyrite occured at an average depth of about 20 fathoms, and this with occasional deposits of bornite, has held down either in large or small proportions to the present deepest point of operations. When these mines were in full work they employed upwards of 1,000 men and boys, and a population of not less than 20,000 souls was attracted to the spot. The annual report presented to the shareholders on the 23rd February, 1887, shows the present number of men and boys employed to be 637. The copper in hand on December 31st, 1886, has been valued at £40 per ton net in the colony, and the stocks of ore at 8s. per unit. The estimated profit for the year is put at £2,212 15s. The ore raised and dressed from waste ores during the past year, at the Wallaroo and Kurilla Mines, has been 11,245 tons gross weight of an average produce of 12½ per cent. fine copper. From Moonta, during the year, 21,562 tons of ore have been received for smelting, and the total quantity of copper made during the year equals 6,207 tons. Since the last annual meeting the directors have purchased the Kurilla Mine for £13,865. At Wallaroo operations are now restricted to dressing up the waste ores at the surface, sinking the office shaft, and raising a limited quantity of ore from stopes and tribute pitches. (1887.)

The Mooroo Mine is a few miles to the west of Prism Hill, and about twenty-five miles north of Mount Chambers. The indication in this mine was a hill stained with copper from top to bottom. The only work done here was the sinking of two shafts to the depth of six and eight fathoms respectively. About twenty tons of ore were raised. The water came in strongly, and no promising lode was found. (Austin, 1863.)

Morphett's Mine.—Fifty-one miles N.E. of Adelaide. No records obtainable. (1867.)

Mortlock's Mine, near the Burrawing, Tumby Bay. No records obtainable.

Mount Bold, east of Clarendon.—Copper ore and galena occur here, and have been worked to a slight extent. (1883.)

Mount Burr Mine is fourteen miles north of Patsey's Springs, and fifty-six miles north of the Blinman. The rock, of which the mount is composed, and mainly also the spur on which lies the mine, is a coarse quartz grit, silicified and concretionary in places, and therefore assumes an appearance similar to the cupriferous outcrop of the Ooraldana Mine. Shallow shafts have been opened on the spur, and the ore, according to specimens lying about, consists of earthy-green carbonate, with some

chloride, and occasionally blackish grey, and, more rarely, red oxide of copper. This is associated with more or less brown hematite. The main ore-bearing part of the mine lies close along the boundary of the quartz grit and calcareous slate. This slate is also ferruginous and concretionary in part, and strikes E. 35° N., and dips N. 35° W. at 40° to 50°. The principal workings consist of a tunnel about four chains in length, starting from a small gully. In this tunnel are exposed, interstratified with the slate beds, brown iron ore, richly and intimately impregnated with grey oxide and green carbonate of copper. This lies in thin layers, the thickest of which is not more than three inches. The walls, which are rather soft, contain green carbonate, mixed with chloride of copper; they also show glistening crystalline particles and thin veins of selenite. Further in, where the tunnel takes a strong bend to the southward, is to be found on the face a large pocket of ochreous brown iron ore. (Ulrich, 1872.)

Mount Chambers Mine, six miles south of the hill of that name, and thirty-two miles east of the Blinman. The surface of the ground is covered with boulders of primitive limestone. Several large blocks of malachite were found in a clear space, running north and south between the boulders. There is no regularly defined lode, although in one place the arrangement of the ore bore very much the appearance of one. Blocks of ore were found in three different parts of the section. The country is moderately hard pipeclay. Several shafts were sunk, but no lode was found, although a good deal of malachite and green carbonate is scattered on the surface. (Austin, 1863.)

The Mount Coffin Mine lies forty-one miles N.N.W. of the Blinman, and about one mile S.E. of the Mount Coffin Trig, on the side of a steep hill. The lode runs almost east and west, and carries a small but rich quantity of ore, composed of chalcocite, malachite, and atacamite, in a much jointed slate. The dip is S. 10° W. 65° to 70°. Two or three small shafts have been put down, and an incline drive following down the shaft alongside the lode. The lode is traceable for about two miles on the surface. The underlay is about two feet in six to the south. About 78 tons of ore have been raised. It is very dredgy, and would require machinery to dress it. The mine stopped working in 1883.

Mount Craig.—Sixteen miles east of Wonoka. A great deal of work was done here, but no important results followed. (Austin, 1863.)

Near Mount Deception, between Beltana and Wirtawena Mines, six mineral sections were taken up for mining purposes. They yielded some fine specimens and nothing more. (1860-9.)

Mount Desire.—In the neighbourhood of this hill, which is situated about thirteen miles S.E. of Mernmerna, on the Great Northern railway, two mineral claims were taken out. They were west of the mount, at distances of three and eight miles respectively. Very little work was done upon them, though the indications of copper ore were considered good. (1860-9.)

Mount Elkington Mine, six miles west of the Blinman. Three sections were taken out. Copper shows on two of these in a well-defined lode. No record of work done. (1860-9.)

The Mount Emily Mine is eleven miles due south of the Blinman, and five miles from the mount itself. It is near the top of a small conical hill. The work is represented by a small excavation, opened in a calcareous, mullocky shale. This is permeated by green carbonate and chloride, and contains scattered specks and small seams of grey oxide of copper. There are also present irregular roundish lumps of crystalline limestone, which, on being broken, show copper colouration throughout. Resting on this deposit, and forming the top of the hill, is an impure limestone, which

apparently dips at an angle of 50° or 60° northward. The cupriferous shale seems to form an interstratified layer between limestone deposits. A bold outcrop of quartz commences about ten chains N.E. from the excavation, striking N. 20° E., and dips nearly vertically. Copper stains and coatings show here and there; but the principal ore enclosed is galena, in thickly-scattered specks, small patches, and occasionally in veins. Two other outcrops are close at hand, but neither of them show copper stains nor lead-ore impregnation. The country between these reefs consists of indurated calcareous shales and slates, with interstratified bands of hard limestone; the strike is nearly east and west, dip N. at 50° to 60°. These rocks, judging from fragments scattered on the surface, seem to be traversed in the vicinity of the mine by small dykes of diorite greenstone; and about a mile southward, on the slope of a range, is a massive outcrop of the same rock. This should receive the attention of the prospector, for the reason that in Victoria dykes of this rock are traversed by auriferous quartz veins. Some of the richest mines in that colony are working on similar dykes. (Ulrich, 1872.)

Mount Euro Mine is situated amongst high and rugged hills, twenty-eight miles N.E. of the Blinman. A heavy reef of quartz and ironstone carries strong green and blue stains of copper, with occasional small pieces of ore; and in one place some good specimens of grey oxide were found. No work has been done on this section. (Austin, 1863.)

The Mount Gunson Copper Mine is situated about eighty miles N.N.W. of Port Augusta. There are two lodes, bearing N.E. and S.W., and ranging from 6ft. to 18ft. in width. The ore consists of green and blue carbonates, and grey ore, containing about 26 per cent. of metal. The work done has been nothing more than surface prospecting, and about five tons of ore have been raised. The veinstone associated with the metallic mineral is quartz, and the country rock is sandstone and slate. The mine was discovered about the year 1875.

Mount Hemming Mine, ten miles S.E. of Beltana township, and sixteen miles N.W. of the Blinman. A shaft 38ft. deep was sunk, disclosing a good lode at bottom. (1860-9.)

Mount Liverpool Mine lies about twenty-six miles to the north of Port Lincoln. According to Mr. Austin, some good ore has been raised from it at different times, but owing to the hardness of the ground work has been long discontinued. There were 2,000 shares at £5 each.

The Mount Lyndhurst Mine is situated twenty-three miles S.E. of Farina, and is represented by three small batches of workings on two low east and west ranges that closely adjoin. The stuff exposed in each of these workings consists of soft, shaly mullock, traversed by thin seams of quartz, thickly impregnated and coated with chloride and silicate of copper. Solid, small, nodular masses of these ores are rare, but in the two excavations near the top of the range there occurs a calcareous gossan which encloses occasional specks of grey oxide of copper.

The second batch of workings lies in the same range, about ten chains further east, and consists of two shafts about 100ft. apart The deepest of these is about 20ft., and the two are connected by a drive. The ore-deposits here are of the same character as those in the first batch. Judging from some specimens left near the shafts, the ore has been of pretty good quality.

The third batch of workings is situated on the northern slope of the opposite low range, about ten chains southwards of the place just noticed. There are a number of shallow shafts, and one about 40ft. deep is sunk on what appears to be a regular gossan lode 1ft. or 2ft. thick. This is combined with a quartz reef which crosses the country at a strike of W. 10° N., dipping southerly at 45° to 50°, and which can be traced from this point further eastward for nine or ten chains along the slope of the range. The gossan contains veins and patches of very good ore, composed of

dense grey oxide, intimately impregnated with chloride of copper. Portions consisting of a hard silicious brown iron ore enclose occasionally large and small particles of red oxide and specks of native copper. There are three parallel quartz reefs which occupy conjointly a width of 40ft. to 50ft., and extend for four or five chains in length at a strike nearly east and west, with apparently a steep southerly dip. The quartz is full of patches, and is traversed by veins of brown iron ore, but shows no copper indications.

As regards the country traversed by the cupriferous gossan veins and quartz reefs, it consists of white and grey, much jointed, feldspathic-looking slates, alternating with slaty, more or less ferruginous sandstone. Mean strike E. 5° N.; dip N. 5° W., at 33° to 35°. Considering the character of the copper ore, and that it occurs in gossan veins, connected with well-defined quarts reefs, which are true lodes, the last-mentioned place presents encouraging prospects.

Prospecting for gold in the alluvial drift of the gully, and on the surface of some of the slopes of the adjoining ranges, would be advisable, as the country does not look unlikely for this metal. (Ulrich, 1872.)

Mount Lyndhurst Mine No. 2 lies about seven miles west of Mount Lyndhurst No. 1, on top of a steep hill that rises about 120ft. above the adjacent gully. The copper ore occurs here in a number of closely-adjoining gossan and quartz veins, which vary in thickness from 1ft. to 8ft. These cross light, bluish, flaggy, more or less concretionary, arenaceous slates at a strike of N. 45° E., and dip N.W. at 40° to 45°. In the walls of these veins, and in the less regular hanging walls, there seem occasionally to occur pockets and irregular veins of brown iron ore and grey oxide, intimately impregnated with chloride and carbonate of copper. The ore, as seen in the heaps on the ground, is of rather poor quality, consisting of a breccia-like mixture of concretionary gossan and quartz, impregnated with chloride, carbonate, and grey oxide of copper.

The country lying between these two mines (Mounts Lyndhurst, Nos. 1 and 2), and for several miles northwards, presents quite an auriferous aspect, and well deserves to be prospected for gold. (Ulrich, 1872.)

Mount Nor-West—A copper mine, E.N.E. of Kingston's well, has been worked by means of some shallow shafts, but the indications are slight. Green carbonate of copper occurs in the joints of a quartzite band, striking N.W. through calcareous and clayslates. (1883.)

Mount Rose Mine is about fifty-six miles N.N.E. of the Blinman. It is situated two miles north of Mount Rose, at the foot of a high spur. One main shaft and several smaller ones have been sunk to a depth of 10 to 13 fathoms. The copper ore, apparently, occurs in two or three short pipe veins running close together or intersecting each other, and dipping, as a body, steeply westward or nearly vertical. The surface outcrops of these veins seem to have consisted of large masses of gossan, more or less thickly impregnated with malachite, and, occasionally, azurite. Of the ore occuring in depth, a lot left near the main shaft indicates it to be an irregular dense mixture of iron pyrites, copper pyrites, and impure copper glance, but the iron pyrites predominates.

A soft micaceous slaty shale appears to form the veinstone in depth.

The country in which the veins occur is composed of massive beds of yellowish grey arenaceous-banded slates and slaty sandstones, which alternate with thin bands of dense crystalline limestone and calcareous shale and sandstone. The strike and dip of these rocks is indistinct close to the mine, whilst, further off, great differences in strike and dip indicate a strong curve, or, perhaps, some disturbance in the beds. Considering the nature of the ore and the relation of the veins to the country, there is a good chance of the veins continuing in depth. There is, however, one cause for apprehension, namely, that the iron pyrites, which is already very abundant, might still more increase in depth, and thereby cause a serious deterioration in the quality of the ore. (Ulrich, 1872.)

Mr. E. F. Cooke, of the E. and A. Copper Company, kindly furnishes the following information from his recollections of the mine:—

No regular lode, I believe, was discovered, although large quantities of grey sulphurets and black oxides were raised, and sent down for smelting at Port Adelaide. This ore was of a very high percentage, the solid being sold at from 45 per cent. to 52 per cent., and the dredgy stuff averaging from 32 per cent. to 35 per cent. The ore was discovered in patches, interspersed throughout with what appeared to be sedimentary ground. Two shafts have been sunk, the deepest being 33 fathoms, and drives have been put out in all directions, extending about 25 fathoms in an east and west direction, and about 15 fathoms in a north and south direction. The greater part of the ground has been taken away to the 23-fathom level. In sinking between the 23 and 33 level some solid leaders of mundic were cut through, and in a drive from the bottom of the 33 two leaders of the same mineral with traces of black ore were found, and at the end of the drive what appeared to be a solid lode. On picking into this it let down such a quantity of water that the engine was unable to cope with the influx, and the mine was shortly afterwards abandoned. (1886.)

Mount Rose North.—This is an adjoining section of similar characteristics.

Mount Remarkable Mine.—Copper ore was found here about the year 1846-7. It was of fair quality, and some samples of it, together with a mineral supposed to be emery, were sent to England. The lode was small and "pinched," and the ground very hard. Nothing worth the name of mining was done, and the claim was abandoned. The mine is 175 miles distant from Adelaide. (Austin, 1863.)

Mount Rugged, or Patawartie.—Nine miles N.N.E. of the Blinman. This claim contains several lodes, having backs of ironstone protruding above the surface, and showing green carbonate of copper, and yellow ore. In addition to good specimens of ore, bismuth of a high percentage has been found here. (Austin, 1863.)

The Mount Stuart Mine lies eighteen miles N.N.E. of the Blinman. A large mass of rocks, running across a gully, contained stains of copper and a good vein of ore. Two shafts were sunk near the rocks, one on each side of the gully. There was some ore on the floors, and blue and green carbonates, but the general appearance was not favourable. One of the shafts was sunk to a depth of 10 fathoms. (Austin, 1863.)

The Muldana Mine lies to the N.W. of Wirrawilka Mine, and about fifteen or sixteen miles east of Wonoka. It is said that a large lode runs through these sections, north and south, containing iron, green carbonates, and yellow and grey sulphurets of copper. There is no record of work done. (1860-9.)

Mules' Yard Mine, county of Burra, lies near Stony Gap. Has been long abandoned.

The Nackara Mine consist of some shallow workings, fifty or sixty miles north of the Burra. Specimens showed red oxide, and grey and green ore and oxide. Two shafts were sunk to a depth of 12 and 6 fathoms. The lode was said to be 2ft. wide. (1867.)

Nairne.—A copper mine was opened here, but not further tested.

The Napoleon Mine is in the neighbourhood of Mount Craig, seventy-nine miles from Port Augusta. About 15 tons of ore were taken from this mine, but it has not been worked of late years. The veinstone consists of carbonate of lime and feldspar, containing a few specks of ore. (1867.)

The New Cornwall Mine is one of the Wallaroo mines, and lies about one mile E.S.E. of Kadina. A good display of atacamite was found near the surface, and some valuable specimens of crystallised atacamite were met with—far better, in fact, than any others found on the peninsular—and yet the lode proved to be unremunerative below the surface. An engine shaft was sunk to about 70 or 80 fathoms,

and a large amount of money was expended, but very little ore was found. The mine is at present full of water, no work having been done for about fifteen years.

THE NEW DEVON MINE, Wallaroo, was at one time the property of a separate company, but now belongs to the proprietors of the Wallaroo Mines.

NEPOWIE MINE has a copper lode 18in. wide, containing green carbonates, red oxides, and grey ore. (Austin, 1863.)

NICHOL'S KNOB, in the Mount Lyndhurst district.—One mile east of the Knob, a good deal of work has been done on a mine bearing traces of copper. A tunnel has been driven in calcareous feldspathic and silicious claystones, and calcareous slates and sandstones, containing in the cracks carbonate of iron and gypsum. Other claims are in the neighbourhood. In one, three parallel lines of openings have been put down on gossany lodes in calcareous slates and claystones. A good deal of work has been done on this mine for a distance of 15 to 20 chains. On a third, shafts and stopes have been put in on a gossany lode, striking N. 40° W., underlaying to the east 70°. Very little work has been done on this mine. (1883-4.)

NILDOTTIE MINE, twenty-three miles east of Blinman. The lode is not well defined. There is, however, a lode of galena, which is well defined and looks promising. (Austin, 1863.)

THE NITSCHKE MINE is near Freeling, in the hundred of Nuriootpa. It was opened more than thirty years ago and worked for a time, and has since been worked about the year 1869. There are numerous shafts, one of which is 200ft. deep. The veins have a stike N. 10° E. The veinstone associated with the ore is calcareous spar, the rocks are crystalline limestone, white marble, and talchose schist, (May, 1886.)

NORTH KAPUNDA MINING COMPANY.—Established 1846; 4,440 shares at £5 each. Stopped working 1851.

THE NORTH RHINE MINE is situated about ten miles from Angaston. There are two lodes running nearly parallel in a north and south direction, with an underlay towards the west of about 18in. in the fathom. The ores found near the surface were green and blue carbonates. Three shafts were sunk, the deepest being 43 fathoms, and a drive of 70 fathoms was put in. At 20 fathoms the lode was 4ft. wide, and was composed of ore, mundic, and spar. Owing to the large proportion of mundic, the lode was unremunerative. The mine was first opened in 1849-50, and was worked till 1851; from that date to 1859 it lay idle, but was reworked from 1859 to 1862-3. (Austin, 1863.)

THE NORTH TUNGKILLO MINING COMPANY were sub-lessees of the Australian Mining Company. Having expended £519, and the results not being payable, the mine was abandoned.

THE NUCCALEENA MINE lies thirteen miles N.W. of the Blinman. The open workings indicate that the ore-deposit is a true lode. It is in a flat curve, having a mean strike of W. 20° N., and crossing the steep slope of a hill of medium height, traverses the beds of the country. The strike of these is N. 45° W., with a N.E. dip at an angle of about 33°. The underlay of the load and its thickness near the surface appear to have been very irregular. The rocks near the lode, in depth, consist of hard blackish, thick bedded, calcareous slate, but at the surface they are yellowish-white, rather soft, and full of veins and small patches of brown iron ore with green copper stains. The examination of the metallic and other minerals, as seen in a large heap of ore on the dressing floor, gave the following result:—Ochreous gossan, enclosing massive patches and druses of acicular crystals of atacamite, generally associated with some malachite and silicate of copper, patches of tile ore, a few small veins and patches

of red oxide of copper, and still fewer specks of native copper. Mammillary brown iron ore and calcite appear frequently in irregular cavities.

From below the water level, massive, coarsely crystalline, spathic iron, full of specks, patches and seams of copper pyrites, associated with a little iron pyrites, quartz, crystalline, and in veins, occasionally white calcite imperfectly crystallised, in druse cavities. (Ulrich, 1872.)

A great deal of work was done on this mine, but it was ultimately abandoned. Mr. J. B. Austin, visiting this mine in 1863, remarks that, as regards the houses and other arrangements on the surface, it was far before any other mine in the north.

The Oladdie or Exeter Mine is in the hundred of Eurelia. It was taken out on account of good surface indications, but was never developed. (1860-9.)

Old Noll's Mine adjoins the Daly Mine at the south-west corner of the section. It is on a hill of considerable elevation, and contains a fine deposit of green carbonate and red and grey oxide of copper in a large reef of rocks running for some distance along the top of the range. (Austin, 1863.)

The Onkaparinga Copper Mine is on the Echunga Goldfields. There is no indication of copper at the surface, but a well-defined quartz reef with pyrites strikes north and south with a dip 30° west. It is in sandy micaceous slate of the same dip, and underlies false-bedded micaceous sandstone and grit. This reef was originally prospected for gold. A shaft 30ft. deep was put down alongside the reef, and a tunnel was driven in the side of the hill to within a few feet of the shaft, at about 20ft from the surface. In connecting the drive with a tunnel the present (1884) holders of the mine struck a mullocky copper lode, which makes and leaves the reef at 18ft. from the surface, running vertically down. The minerals contained in the lode are crystalline quartz, pyrites, chalcopyrite, native copper, chalcocite, malachite, and azurite. Two miles eastward, on a hill, is a lode formation with a quartz reef, containing copper stains and small crystals of atacamite. (1884.)

Oraldana Mine is sixty-eight miles N.W. of the Blinman. The copper ore occurs as an impregnation in a ferruginous quartz-pebble conglomerate. This covers an area of several square chains, and from it rise two craggy, highly silicified, irregular masses of from 8ft. to 12ft. high, and standing about two and a half chains apart. These outcrops, as well as the mass between, show abundant copper stains and coatings in every joint and crevice. They also contain small pockets filled with soft, white arenaceous clay, through which little nodular concretions of malachite are scantily distributed. On being broken the softer parts of the rocks show specks, and thin seams of grey oxide of copper, whilst the larger malachite nodules often contain this ore in the centre. Very little work was done on this mine. (Ulrich, 1872.)

The Oratunga Mine lies on the southern slope of a low range about twelve miles N.W. of the Blinman Mine. The ore deposit represents a so-called pipe vein, 12ft. to 14ft. in width and from 6ft. to 8ft. thick, with well-defined walls, dipping eastward at an angle of about 60°. Brown, much cleaved, flaggy slates alternate with greyish-white argillaceous ores. The strike is N. 5° W., and the dip in that direction is somewhat steeper than the slatebeds, which strike N. 40° E., and show a N.W. dip of 15° to 20°. At the outcrop the ore consists of an ochreous gossan, full of small patches, irregular veins, and fine druses of acicular crystals of malachite. There are occasionally similar druses of aragonite associated with it. In depth the ore changes to coarsely crystalline chalybite (carbonate of iron) full of small patches and seams of copper pyrites, and generally associated with quartz. The stoppage of the mine is said to have been caused by the deposit being faulted in depth by a slide, and that the search for it became too expensive. (Ulrich, 1872.)

This slide was met with at a depth of 12 or 13 fathoms, and a floor came in having a slope of about 25°. This was followed down until the work was stopped by water. The depths of the shafts ranged from 6 to 15 fathoms. (Austin, 1863.)

OVERLAND CORNER.—A copper mine was opened here many years ago, but nothing payable was found. (1867.)

PALAWARTA MINE (See MOUNT RUGGED.)

PARABARANA MINE is eighty-four miles east of Farina, and about two miles S.E. of Parabarana Hill. It has three distinct lodes, two running north and south, and one east and west. Two pits have been sunk, and in each blue and green carbonates have been found. This mine has not been worked for some time. (1884.)

THE PARA MINE.—Twenty-five miles N.E. by N. from Adelaide. The indications were good. Work suspended in 1851.

THE PARINGA MINE is in the neighbourhood of the Bremer and Kanmantoo mines, thirty-six miles from Adelaide, About 900 tons of ore were raised, but the mine has been abandoned for many years. (Austin, 1863.) [See PARINGA MINE, under head of "SILVER-LEAD."]

PHILLIPS MINE, RAPID BAY.—Copper lodes were found cropping out of the surface of the ground. The ores consisted of grey, yellow, and peacock ores. (See under "SILVER-LEAD.")

THE PHŒNIX MINING CO.—Established 1850. The property was situated sixty miles north of Adelaide, near Tothill's Gap. Capital, £1,600, £10 shares, £1 paid. Had stopped working in 1851.

THE PINDILPENA MINE is situated on the Paralana Range, west of the Yudnamutana Mine. The ore deposits were green carbonate and grey ore. The lode runs nearly east and west for 70 or 80 yards, and varies in width on the surface from 2ft. to 6ft. (Austin, 1863.)

PINE HUT MINE.—Fifty miles N.E. of Adelaide. No records obtainable.

THE POONAWURTA MINE.—Forty-two miles N.E. from Adelaide. The company was established in 1846. There were 1,000 £5 shares. After spending a considerable sum of money on the property without obtaining any good results in return, the land was sold for £1,000.

THE PREAMIMMA MINE.—Thirty-eight miles S.E. of Adelaide, and about six miles N.E. of Callington. The mine was opened in 1854, and some good ore, chiefly carbonates, was raised. After a time the lode was lost, and the mine abandoned. It was re-opened for a short time about the year 1862, and the engine shaft was sunk to a depth of 47 fathoms. Some black ore was found, but not in paying quantities. Quantities of mundic have been met with throughout, and also some muriate of copper. (Austin, 1863.)

THE PRINCESS ROYAL MINE adjoins and was found prior to the Burra Mine. Considerable success attended the early workings of this mine. A quantity of ore was raised, and showed an average of over 27 per cent. of copper. In 1851 water was reached at the thirty-fathom level. The capital of the company was expended, and the mine was therefore abandoned. The total proceeds of the ore raised were above £7,000. The land (10,000 acres) was sold for a sheep run. (Austin, 1863.)

PRINCE ALBERT'S MINE.—Nine miles from Adelaide, E.N.E. No record.

THE PRINCE ALFRED MINE is situated twenty-eight miles N.E. of Carrieton, on the Great Northern railway. The ore deposit is very interesting, on account of its presenting a fine example of the so-called bedded or layer lode, *i.e.*, it lies both in strike and dip, between the strata, grey, flaggy clayslate. It strikes W. 5° E., and dips W. 5° N. at 45° to 50°. It has been traced for nearly 20 chains in length, showing, as far as exposed, a thickness varying from 3ft to above 20ft. The deposit consists of a confused accumulation of large and small masses of clayslate, connected and traversed by veins of calcite. Through this mass malachite is thickly distributed in seams, coatings, and irregular patches, associated with brown iron ore. Towards, and below the water level, at about 20 fathoms, the green carbonate and brown iron ore give way to a dense impregnation, fine veins and massive aggregations of copper pyrites, but slightly intermixed with iron pyrites, and occasionally associated with small particles of spathic iron and white calcite. In one place the lode is very rich, and is taken out for nearly 20ft. in width. The distribution of the copper ore is not uniform, but varies in richness throughout the workings. (Ulrich.)

Three shafts were sunk in different places on the property, but only one at the principal workings. Large stopes were opened out from the surface down to about 20 fathoms. The greatest depth of any shaft was about 40 fathoms on the underlay, and the water level was reached at 150ft. Drives were put in for some hundreds of feet. The mine has not been worked since 1872.

THE PORT LINCOLN MINE is situated four miles from Tumby Bay. A fair amount of good ore has been raised from this mine at different times, but the hardness of the ground is an obstacle to its being profitably worked. (Austin, 1863.)

Several shafts were sunk, but the influx of water was very great. The property comprises seventy acres.

RAWNSLEYS BLUFF MINE is about fourteen miles east of Mernmerna (Great Northern railway), and S.W. of the bluff itself. A strong reef of ironstone shows on the surface for 250 or 300 yards, and contains some good stones of green carbonate of copper. (Austin, 1863.)

REEDY CREEK MINE. (See TUNGKILLO.)

RHONDDA MINE, four miles north of Carrieton. Has been worked, but no records are obtainable.

RHYNIE seventy miles from Adelaide, and four miles west of Riverton. A copper mine having rich indications was worked here by Messrs. Nickolls Bros. (1867.)

ROSEWORTHY, thirty-one miles north of Adelaide. A copper mine is said to have been opened at a place two miles N.W. (1867.)

THE ROYAL MINING COMPANY OF SOUTH AUSTRALIA purchased lands to the extent of 720 acres, chiefly in the neighbourhood of Kapunda. The cost was £1,500, but no important discoveries were made. Established, December, 1846. Amalgamated with the Emu Flats Association, June, 1850. Capital £90,500, in 9,050 shares at £10 each. (1845.)

SCOTT'S CREEK MINE is about eighteen miles from Adelaide, near Cherry Gardens. It is on the side of a steep, but not very high hill, on the surface of which, in ironstone rock, some strong stains of copper were found, and a shaft was sunk. The ore was chiefly grey oxide, mixed with a little green and blue carbonate. The lode was small, but regular and well defined; at the depth of five fathoms there was but little ore, the lode being composed chiefly of gossan. The lode is nearly a downright one, having but little underlay. (Austin, 1863.)

SCRUBBERS' CAMP MINE is situated about twenty-eight miles north of Kooringa. There are several shafts sunk, and promising ore was found, principally blue carbonates. The ground is soft and easily worked. (1867.)

SHEAOAK LOG, four miles east of Roseworthy.—A copper mine is situated about three and a half miles E.S.E. No records obtainable.

THE SIR DOMINIC MINE adjoins the Daly Mine, about five and a half miles E.N.E. of the Yudnamutana Mine. Here the range rises to a height of 400ft., and its crest consists of an immense rugged mass of ferruginous, highly fractured quartzite, forming a nearly perpendicular wall of over 100ft. in thickness. On account of the mode of occurrence of the copper ore, this mass closely resembles the quartzite layer of the Daly Mine, but the ore contents of the pockets are not so rich as are those of the latter. The rocks of the district present the same varieties as those near the Yudnamutana Mine. (Ulrich, 1872.)

THE SLIDING ROCK MINE, one hundred and thirty-two miles N.N.E. from Port Augusta, is situated on the south side of Sliding Rock Creek at the base of a hill of medium height, composed of hard limestone. The main ore deposit is a lode varying from 1½ft. to 10ft. wide. Its course is tortuous, and has a mean strike of N. 20° E., and with an eastward underlay of 3ft. in the fathom. It traverses the beds of the country, which strike W. 20° N., and dip southward at an angle of about 60°. The walls, which are fairly well defined, consist, on the eastern side, of a blackish aluminous shale, resting against a hard bar or reef of impure brown iron ore; and on the western one, of soft, sandy, concretionary light-colored shale which, near the surface, is more or less thickly stained with blue and green carbonate of copper, and brown iron ore. The existence of the ironstone reef in the eastern wall is of great value to the mine, for the reason that it dams back a seemingly great accumulation of water in the rocks behind. At the surface the ore consists of rather earthy, and not very rich looking, carbonates. But it changes in depth to an association of red oxide of copper, native copper, green and some blue carbonates, in a soft, clayey, partly ferruginous matrix. The red oxide occurs frequently in large crystalline, granular, and vein-like masses; the native copper in pure crystallised masses, occasionally several cubic inches in size; and the carbonate —mostly malachite—forms veins and druses in connection with the former. Beneath the water level, traces only have as yet been discovered of black sulphide of copper ore. About the middle of the length of lode opened, the latter is traversed, without being faulted, by a cross-course of 13ft. in width, and striking W. 17° N. This cross-course carries ore similar to that of the main lode, and has been followed for seven fathoms towards the west. The limestone of which the hill is composed, is greyish-black, microcrystalline, hard and tough, and, according to chemical analysis, contains a large percentage of magnesia, some silica, and carbonaceous matter. (Ulrich, 1872.)

SMITH'S COPPER MINE.—A lode of copper has recently been found near King's Bluff, in the north-east district. It strikes N.W. and S.E., and can be traced along the surface of the ground for some distance. An excavation has been made on a rubbly, broken cap of the lode to a depth of about 10ft., and 4ft. or 5ft. wide, and several tons of ore have been raised. At present, however, sufficient work has not been done to prove the value of the lode, but its appearance is very encouraging. The rocks with which it is associated are quartzite, and quartzose sandstone and granite. (1887.)

THE SOUTH CREEK COPPER MINE is about four miles north of the Burr well, on a large creek. It has been worked on three lodes. Two of these to the south are parallel lodes 3ft. apart, in a calcite reef, with well-defined walls. These dip 82° south, and are easily traced for some distance on the surface. The ore in this lode consists of green carbonates in kaolinized slate. It has been worked to about 70ft., when the water level was struck.

THE SOUTH KAPUNDA MINING COMPANY.—Established 1850; 2,000 shares £10 each. Property situated between the Kapunda and North Kapunda Mines. No records obtainable. (1854.)

SPEAR CREEK.—There is a copper lode here; it lies twelve miles east of the township of Stirling North. (1867.)

THE SPRING CREEK MINE, thirty-five miles from Port Augusta, and eleven miles north of Melrose, is situated on the northern end of Mount Remarkable. A small drive of about two fathoms has been made about 120ft. above the level of the creek, into the hill, and shows several veins of red oxide from 1in. to 6in. in thickness. A reef of rocks running up the face of the hill contains numerous stains of copper. On breaking off pieces of rock where these stains occur, ore is almost invariably found; in some cases blue and green carbonates, but more frequently red oxide and ruby ore, and sometimes a little native copper. (Austin, 1863.)

THE STANLEY MINE, seventy-six miles N.E. from Blinman Mine, and four miles east of Yudnamutana Mine, lies in a low hilly district, or basin, surrounded by high ranges. The country consists of metamorphic slates and sandstones, which strike W. 15° to 20° N., and dip southerly at angles varying from 60° to 85°. There are four separate lodes, much resembling one another in mineral character. The one nearest the Daly Mine lies on a low range, and crosses micaceous slate. It is from 2ft. to 4ft. thick, and at the surface is composed of gossan, beneath which succeeds slaty and clayey mullock, with argillaceous veins, and also patches and veins of quartz and calcite. Judging from some specimens left on the surface, the ore seems to consist of concretionary lumps and irregular veins of malachite and azurite. Some of the gossan ore, on chemical examination, showed very faint traces of bismuth.

The length of the vein appears from the workings to be only about one and a half chains, its strike N. 30° W., and its underlay W. 30° S., at an angle of 55°. The walls are not well defined. About the centre of its length it makes a sharp turn W. 30° N. for about 6ft. The workings are—a deep underlay shaft communicating with a vertical one sunk to the depth of 30ft., where it strikes the underlay of the lode. Another vertical shaft, about 50ft. deep, lies in a gully in the line of the strike of the lode, and about five chains north of the underlay shaft, but neither traces of lodestone, nor even copper stains, are observable in the spoil heaps around it.

The second lode lies about twelve chains east of the first one. The ore occurring in depth consists of brown iron ore, inclosing patches of copper pyrites, iron pyrites, malachite, and azurite. The workings consist of a short trench and an underlay shaft apparently, 55ft. deep. Judging from these the ore seems only to extend for about 15ft. in strike. The strike of the lode is W. 30° N., and it dips S. 30° W. at an angle of about 65°. Its hanging wall is well defined, and is represented by a strong reef of quartzite. The foot wall is less regular, and consists of micaceous slate.

The third lode lies about eleven chains S.E. of the foregoing one, and much higher up the range. The ore enclosed in the outcrop is of a far superior quality to that of the others, consisting of veins and solid lumps of malachite, azurite, and tile ore, embedded in cupriferous brown iron ore. Both the carbonates appear also frequently crystallised in cavaties. The presence of bismuth ore could only be detected by chemical examination. Traces only of it could be found, notwithstanding that it had been reported to have occurred in large quantities. The workings consist of underlay shafts—one apparently 60ft. in depth—and shallow excavations on either side. In a distance of not more than one and a half chains the lode showed great irregularity of strike and dip — the former being in the mean W. 15° N.; the latter, according to the main underlay shaft, 80°, in a shallow excavation on east end, about 45° southward. The thickness of the lode varies from 2ft. in the western to above 8ft. in the eastern workings.

The fourth lode is similar in character to the third lode. Its features, more especially conformity in strike and dip, indicate that it and the foregoing ones are

"makes" of the same great lode, the fissure of which is closed, or perhaps only indistinct on the surface between.

The workings comprise a small excavation on east side, and close to the gully, and a tunnel of about one chain in length driven into the hill opposite. At the opening of the tunnel there is a rugged protrusion of quartzite traversed by quartz veins. (Ulrich, 1872.)

THE STRATHALBYN MINES were originally opened by private enterprise in 1848. Some good copper ore was raised and smelted on the property. They were afterward sold, but were never re-worked. (Austin, 1863.)

TORRENS RIVER MINE.—Sec. 5536. No records.

THE TOWER HILL MINE lies between Tower Hill and the Avondale Mine, and is about twenty miles S.E. of Farina. The lode is about 6in. to 8in. wide, with no well-defined walls. As it goes down it is improved in bulk by the addition of small leaders, and is dipping 30° to 56° E., whilst the rocks, which are calcareous slates, dip 75° N. The workings consist of an underlay shaft of about 60ft. in depth, and from there the lode has been followed by a drive for 40ft. without any apparent change. The ore consists of chalcocite, with stains of malachite and a little chalcopyrite and atacamite. About 20ft. south of the lode is a well-defined reef of calcite with copper stains. It is probable that this will join the lode lower down, when it will assume a more definite character. (1884.)

THE TWO BROTHERS MINE is situated about two miles north of Nuccaleena. The indications were good at first, a lode of rich oxide, 2ft. in width, being traceable for the whole length of the section. But when sinking and driving was begun the lode was lost. (Austin, 1863.)

TRESEVEAN MINING COMPANY, a lease from the Britannia Mining Company, Bremer. Stopped 1851. No records. (1854.)

THE TUMBY MINE is eight or nine miles north from Tumby Bay, Spencer's Gulf. The lode is 3ft. 6in. wide, and consists of blue and green carbonates, gossan and spar. Two shafts were sunk, one to a depth of nine fathoms and one to 7ft. (1867.)

THE TUNGKILLO or REEDY CREEK MINE, the property of the Australian Mining Company, is thirty-four miles north-easterly from Adelaide. The company was formed in 1845, and operations were begun a year or two later, and were continued up to 1858, when the works ceased. During that time the money spent in developing the mines, at Tungkillo and Charlton, amounted to upwards of £108,217. A number of shafts were sunk, and the work was conducted in accordance with the most scientific methods of the day. The ores were of very poor quality, the greater proportion yielding only from 6 per cent. to 18 per cent. of copper, while the highest given by a small quantity, was 33½ per cent. Referring to the "Royal South Australian Almanac for 1848," it is there stated that the Tungkillo Mine contained emery, and that in December, 1847, 100 tons were sent to Port Adelaide for shipment. The following account of this mine is taken from an article, dated 1850, in "Iron," Volume VII. :—

There were two lodes at the north end of the property and six at the south; near the former the ground was dark grained micaceous granite. Above the water level of the mine, there were carbonates, black oxide, and black sulphurets; and below the level, copper pyrites. Iron was conspicuous in all the lodes, and the rock was very hard. The mine contained a chamber 20ft. high, from which had been taken an immense bunch of ore. When, however, this bunch was quarried out, the lode suddenly contracted and soon passed off into mere strings. Efforts to secure better ground or to find another bunch, were unsuccessful.

On Baker's lode, the workings comprised two shafts of 60 fathoms and 40 fathoms, respectively. At the 40-fathoms level there was an adit and railway 198 fathoms in length, and in addition there were three other levels of 95, 70, and 30 fathoms in length.

Uroonda Lodes, hundred of Uroonda, have not been worked.

Vesey's Claim is about ten or twelve miles N.E. of Nuccaleena. There is a well-defined lode running nearly through the section, and containing rich ore, green carbonate and grey oxide, and some of the latter is said to contain 70 per cent. of copper. The country consists of clayslate and pipeclay. Little work has been done. (Austin, 1863.)

The Victory Mine is on the top of a hill about 80ft. high. It is three miles east of Mount Bourne, and thirty-two miles N.E. of Beltana township. The hill is composed of quartzite, dipping to the south. The lode runs north and south, and dips E 68°; it is from 9in. to 4ft. in width; has a well-defined foot wall, but no hanging wall. The ore consists of chalcocite with malachite and atacamite, dark oxides and sulphides. It runs in a shoot to the N. 45°, from 30ft. to 40ft. long and 20in. wide. The mine has been worked to a depth of 170ft. by an underlay shaft without striking water. The lode has twice pinched out and made again. Three shafts were sunk, and drives to the extent of 100ft. were made on the course of the lode. Three hundred tons of ore have been sent away during the last year or two, averaging, it is said, about 31 per cent. (1884.) The mine is not now being worked.

Vocovocana Mine, west of Apex Hill, has a well-defined north and south lode, and good grey ore has been raised from it. The lode shows for about 200 yards on the surface. (1860-9.)

The Wakefield Mine, sixty-nine miles north of Adelaide. Opened in 1845 with a paid-up capital of £1,300 in 650 shares of £2 each. A copper lode of considerable regularity was operated on, and some cwts. of copper were produced. The quality was good. (1848.)

Wallaroo. (See Moonta.)

Warrakimbo Mine, N.W. of Kanyaka. No records obtainable.

The Warrioota Mine lies on the northern slope of a low range, about ten miles S.E. of the township of Beltana. The ore deposit is a lode 1ft. or 2ft. wide, which strikes E. 15° N.—very nearly coincident with the strike of the country—but dips irregularly through the latter, first for a few feet vertical in depth, and then at an angle of 70° northward. The hanging wall looks well defined, but the foot-wall seems irregular. Judging from the nature of the vein stuff left near the two deepest shafts, the general mineral character of the lode alters within a short distance. At the one shaft it is composed of a soft, somewhat calcareous, quartzose mullock, densly traversed by thin quartz veins. These enclose small nodular masses of earthy malachite, and occasionally of azurite, associated with calcite. A trial of some of the ore gave traces, though very faint, of bismuth. Specimens of vein-stones left near the other shaft consist of a dense and hard ferruginous and highly quartzose striped matrix enclosing thin seams, and small druses of acicular crystals of malachite, besides veins of cupriferous gossan. In general these veinstones resemble the poorer surface stone of the Blinman Mine. No trace of sulphide ore could be detected. The country in the neighbourhood of the workings looks undis-turbed, and consists of alternating beds of thin cleavable slates and fine grained, thin bedded, partly micaceous, slaty sandstones. Strike E. 20° N., dips south-ward at an angle of about 35° some distance eastward of the workings near the line of the lode. Judging by the rather poor ore last raised, and left on the ground, the future prospects of the mine are not very favorable.

If gold crushing and saving machinery were at hand, the trial of a few tons of the lodestone for gold is to be recommended, and the prospecting for this metal generally in the gullies and in the quartz reefs in the neighbuorhood. In fact, a zone of country

of considerable width exists in this neighbourhood, which is traversed by strong promisinglooking quartz reefs, and altogether presents an auriferous aspect. (Ulrich, 1872.)

WAUKALOO MINE, seven miles north-east of the Boolcoomatta Mine. No records obtainable.

WEBB AND ROBERTSON'S MINE is about one mile east of Nicholl's Knob, near Mount Lyndhurst. The lodes follow the strike and dip of the rocks which are calcareous slates, much floored. They strike N. 20° W., and dip 67° E. 20° N. There are three lines of lodes, the one to the north has been prospected only; it consists of calcite and gossan, with grey ore and pyrites, about eight inches wide. The middle lode has been worked by a shaft 30ft. deep. It is 4ft. wide, but not well defined. (1884.)

THE WELCOME MINE is sixty-eight miles N.E. of the township of Beltana, and about eighteen miles S.E. of the Yudnamutana Mine. There are two small batches of workings on adjoining spurs, a higher and a lower one. The workings on the higher spur consist of an open trench 3ft. to 4ft. wide, and about 40ft. long, exposing a quartz reef of 1ft or 2ft. in thickness. It strikes N. 32° E., and dips W. 32° N. at 62°. The underlay wall is well defined, and is composed of a gritty silicified sandstone, and boulder conglomerate. The enclosed boulders are mostly quartzite. The hanging wall is less regular, and is composed of fissile, rather concretionary slates. These appear to have been disturbed as, on the top of the spur, they show a very flat dip of about 8° to 10° S.W., while further off they strike N. 30° W., and dip W. 30° S. at 20°. In the reef, and in a few feet of the hanging walls, are exposed solid patches and thick veins of ore, consisting of grey oxide, coated generally with green carbonate and chloride of copper. The ore-bearing part of the country does not seem to extend much beyond the trench on either side, for towards the south the ore patches disappear, and the veins split and thin out, and northward from the trench no ore is traceable for more than a few feet. In the second batch of workings the ore is of a similar character as that in the first batch. (Ulrich, 1872.)

THE WEST KANMANTOO MINE. (See KANMANTOO MINE WEST.)

THE WHEAL ACRAMAN MINING COMPANY.—In 640 £4 shares; ten miles E.N.E. of Adelaide, near the Montacute Mine. (1854.)

THE WHEAL AUSTIN MINE is half a mile S.S.W. of the Yudnamutana Mine. An immense reef of ironstone and gossan contains strong stains of copper, and numerous stones of green carbonate and grey oxide; it is from 18ft. to 20ft. in width, and its course is very regular. (Austin, 1863.)

THE WHEAL BARTON MINE, near Angaston, was worked for a time and then closed. No results. (Austin, 1863.)

THE WHEAL BESLEY MINE, twelve miles N.E. of Sliding Rock Mine. There are two lodes on the section bearing very good gossan, impregnated with green and blue carbonates, and containing occasional good stones of ore. The lodes run north and south, and are traceable for a distance of 300 yards. Liver-coloured and yellow ore is found scattered on the suface. (Austin, 1863.)

THE WHEAL BLINMAN is near the Blinman Mine. The lode runs nearly north and south, and is distinctly traceable for about 200 yards on the surface. It is backed by a reef of indurated clayslate, intermixed with ironstone and gossan. In the clayslate small pieces of green carbonate and grey ore are found. At the top of a hill the lode forms into a large "blow" in which the ore was discovered. On the

rocks being broken away a fine lode of rich ore was seen, 8ft. wide, and underlying westward into the hill about 18in. in the fathom. Five shafts have been sunk on this lode, ranging in depth from two to nine fathoms. Some rich green and blue carbonates were occasionally met with, and specks of the finest yellow ore. (Austin, 1863.)

THE WHEAL BUTLER lies about two miles N.E. of the Blinman. A good lode passes through the property, and this has been opened at intervals for nearly a quarter of a mile. It yields a peculiar reddish-brown or liver-coloured ore, supposed to be merely a variety of ironstone, but which on being assayed produced 37 per cent. of copper. The back of the lode consists of ironstone, micaceous iron, gossan, and quartz, and below these, stones of green and blue carbonate, and a quantity of liver-coloured ore are found. The underlay is about 3ft. in the fathom. (Austin, 1863.)

THE WHEAL FORTUNE MINE is situated on land leased from the Paringa Mining Company (1850), in the Mount Barker district. It has yielded black oxide and other ores.

THE WHEAL FRIENDSHIP MINE, established 1850. A lease from the Britannia Mining Company. Stopped working in 1851. No records.

THE WHEAL FROST MINE is close to the Yudnamutana Mine, and consists of a small conical mountain of greenstone, thickly impregnated with green carbornate and red oxide of copper. Geologically considered the belt of range country stretching from west of the Yudnamutana mines towards the Freeling heights has every prospect of containing copper ore deposits and, perhaps, gold. (Ulrich, 1872.)

THE WHEAL GLEESON is one of the Yudnamutana mines. There are three shafts. The lode strikes irregularly north and south, with a dip steeply eastward. It is apparently from 1ft. to 3ft. in thickness only, and consists, near the surface, of rubbly slate, mullock full of veins and irregular masses of brown and micaceous iron ore, enclosing seams, solid patches, and coatings of earthy malachite. (Ulrich, 1872.)

THE WHEAL HANCOCK MINE is adjacent to the Welcome Mine. There is a good and distinct lode, traceable for about 250 yards. It is about 18in. wide, and consists of fine grey oxide. There are veins and stains of ore, with small pieces of malachite scattered on the surface near the lode, which runs N.E. and S.W., underlying westward into the hill. (Austin, 1863.)

WHEAL HARMONY, twenty-five miles east of Adelaide. No records obtainable.

THE WHEAL HUGHES MINE.—One of the Wallaroo mines.

THE WHEAL HUMBY MINE is four miles S.W. of Moonta, Yorke's Peninsula. Indications, similar to those at the Moonta, were found, and on sinking four fathoms, the back of a lode was cut, consisting of ironstone mixed with green carbonate of copper. (Austin, 1863.)

THE WHEAL JAMES.—One of the Moonta Mines.

THE WHEAL MARIA MINE is between the Daly and Yudnamutana mines. It has a good lode of ore traceable for 130 yards north and south. (Austin, 1863.)

THE WHEAL MARIA, eighteen miles S.E. from Adelaide. This mine was opened as a copper mine about the year 1850; but, owing to its not being immediately productive and for want of capital, it was abandoned. About the year 1886 it was re-opened as a silver-lead mine. (See ALMANDA, under "SILVER-LEAD.")

WHEAL MARY MINE, twenty-five miles E.S.E. of Adelaide. No records obtainable. (1864.)

THE WHEAL PROSPER, a lease from the Britannia Mining Company. No record.

THE WHEAL SARAH is in the neighbourhood of Bundaleer station, near Clare. There are three east and west lodes, with a dip of 75°. They have been worked a few feet only. The ores are micaceous iron mixed with green carbonates and sulphurets. The country is hard silicious white and brown rock with bands of grey arenaceous slates and brown sandstone, with a dip W. 85° to 90°. (Selwyn, 1859.)

THE WHEAL STUART MINE is about three and a half miles S.S.E. of the Moonta. A quantity of green carbonate ore was found on the surface. A shaft has been sunk for eight and a half fathoms, through gossan, steatite, ironstone, and quartz. (Austin, 1863.)

THE WHEAL SUSAN MINE is on the eastern plain, near Paralana. There is a strong lode of ironstone running above the surface for 50 or 60 yards, and containing grey copper ore and green carbonate. There is also a good cross-course running into the lode. (Austin, 1863.)

THE WHEAL WILLIAM and THE WHEAL ALFRED.—These mines are ten miles east and S.E. from Keyneton, fifty-nine miles N.E. of Adelaide. No records of work done are obtainable.

THE WILLOURAN MINE is fourteen miles S.W. of Hergott, and about five miles north of Willouran Hill. This mine was opened about the year 1880, and 100 tons of copper ore were raised and sent away, the average produce being 24 per cent. of fine copper. The ore is very ferruginous, and is combined with oxides and oxychlorides of copper. The lode is traceable along the range for a distance of four miles, and ore has been found, with a few slight breaks, for several miles further. A shaft was sunk to a depth of 50ft., and a drive was put in for about 100ft. on the course of the lode. Nodules, apparently of iron, are found on the surface, but, when broken, the iron is found to be but a thin coating, the bulk of the stone being grey oxide of copper of 35 or 40 per cent. The district further north, beyond the "Dome," contains other rich deposits of copper. (Austin.)

WILLOW CREEK MINE.—North of the Napoleon Mine. No records obtainable.

WIPERAMINGA MINE, near Boolcoomatta, forty-three miles north-east of Mannahill. Two or three shafts and open cuttings have been made on quartzite reefs. These are composed of quartz and ironstone, stained with blue and green carbonate of copper. The quartzite and micaceous schists and slates are penetrated by coarse granite dykes. This mine has been abandoned for some time, and, as far as can be judged, no defined lode has been found. (1885.)

WINDITTIE MINE. (See ARNO BAY.)

WIRTAWEENA MINE.—No records obtainable.

WIRRAULTEE MINE.—No records obtainable.

THE WIRRAWILKA MINE is situated fourteen miles east of the township of Hawker, and about two miles north of Mount Plantagenet. The rocks of the country seem principally to consist of metamorphic slates and limestone. Some irregular workings in the limestone appear, from specimens left on the ground, to have yielded some very good ore, grey oxide of copper enclosed in concretionary masses of green carbonate. The ore appears to occur in pockets, as there is no evidence of a lode

crossing the limestone. The limestone is hard, sometimes coarsely crystalline, and is coated with green carbonate, and shows abundant joints and crevices.

Another batch of workings consist of one deep and four shallow shafts, sunk in line, over a length of three chains. The ore deposit here is a contact lode, bearing a great resemblance to that of the Yudnamutana Mine. It runs at a strike of N. 15° E., with apparently a steep westerly dip, within the boundary of a strong dyke of diorite greenstone and chloritic and micaceous slates; these near the surface are very soft and friable. The copper ore raised appears to have been green carbonate, rarely associated with grey oxide of copper. From masses lying near the shafts, it would seem as if micaceous iron ore, calcite, and lode slate were the nearly exclusive occupants of the lode fissure, and that the copper ore occurred very sparingly through them. A mineral, abundant in the spoil heap of the deepest shaft, of lavender-blue colour, and fibrous texture, proved to be the rare species crocidolite or blue asbestos. (Ulrich, 1872.)

THE WOMBAT MINE.—The name of one of the Wallaroo mines. A description is included in that of the Home Mine, which see.

WOODLOOMOOKA.—A copper locality in the neighbourhood of Mount Jacob, sixty-four miles east of Leigh's Creek railway station. A lode of copper ore has been traced and prospected for some distance by holes from 10ft. to 15ft. deep. The lode formation is from 3ft. to 4ft. thick, and rich veins of copper glance have been exposed. Two miles northwards several shallow pits have been sunk. In one of these, at a depth of 8ft. or 10ft., in a well-defined lode formation, a vein of rich copper ore is exposed, which is worth sinking on. (1884-5.)

THE WORTHING MINE is near Morphett Vale, sixteen miles south of Adelaide. This mine has been abandoned for many years, owing to the hardness of the ground and to the ore not having been found in paying quantities. The lode strikes E. and W. and contains quartz, iron and copper pyrites. The rocks are clayslate. There are several shafts, and the pumps are still in the mine.

THE WYAKA MINE, 210 miles north of Adelaide, and about eight miles S.W. of the Blinman Mine. It has long been abandoned. (1867.)

YALPOODNIE MINE is in the neighbourhood of Franklin Harbour. One shaft was sunk to about 20 fathoms. No work has been done upon the mine for the last twenty years.

THE YELDA MINE is one of the Yudnamutana mines. A fine regular lode is visible for nearly 300 yards, running S.E. by E. There are also two secondary lodes running parallel to the main lode.

THE YELTA MINE.—Comprised in the Moonta mines.

THE YOOTOOMOOKINA MINE, sixteen miles east of Blinman, has a north and south lode of copper, traceable for nearly one mile. It is about 5ft. wide, carrying good ore 15in. thick. The underlay is about 1ft. in the fathom west. (Austin, 1863.)

THE YUDNAMUTANA MINES are situated about 168 miles N.E. of Port Augusta, and about sixty miles S.E. of Farina. A feature of great geological interest in this district is the presence of an intrusive rock—a peculiar kind of greenstone—with metamorphic concomitants of great variety of texture and mineral character. The chief and most developed ore deposit is a so-called "contact lode." It runs within the boundary of the intrusive rock on the east, and the accompanying metamorphic schists on the west, lying in places between the two, or traversing one, sometimes the other, rock in its course. Its mean strike is N. 10° W., and its dip eastward at 70° to 80°; whilst the metamorphic rocks adjoining strike N. 40°

to 45° W., and dip south-westerly at 60° to 70°. The lode seems to have varied from 2ft. to 15ft. in thickness, and has been traced southward, from the top of the hill, to close upon twenty chains in length. At the furthest point south a vertical shaft has been sunk about 50ft. deep. The ore produced from this was very poor, consisting of brown jasperry quartz, full of veins and patches of micaceous iron and ochrey-brown iron ore, with many scattered green stains and coatings in hollows and joints. Nine chains northward from this shaft is a whim shaft sunk beneath the water level. Ore raised from this shows for the greater part a kind of breccia, composed of brown, jasperry-looking, ferruginous limestone, brown iron ore, and chrysocolla, associated with malachite and occasionally azurite. Of sulphide ore no traces were observable. Besides fine pieces of malachite and chrysocolla there were some smaller ones of reddish grey oxide, which would indicate that the ore from this portion of the lode was of very good quality. From an excavation on top of the hill a large quantity of rich ore—silicate, carbonates, and oxides of copper—was obtained. The western wall of this pit consists of metamorphic slates striking N.W. and dipping S.W. at 65°; the eastern one of massive greenstone, showing here and there small protruding bosses of a syenitic character. The lode shows in the northern face of the pit, but is thin and apparently very poor, and continues so on the surface. In open workings and in a tunnel close by the ore was of similar character.

Judging from the appearance of the district, there is no reason why gold should not exist and be found both in the reefs and the creeks if properly prospected for. (Ulrich, 1872.) See under "Gold."

SILVER-LEAD.

THE ACLARE MINE is situated on section 1296, in the hundreds of Kanmantoo and Strathalbyn, and is close to the village of St. Ives. The property comprises 269 acres, and is watered by the Mount Barker and Nairne creeks. There are nine lodes disclosed in this mine at the present time; they bear N. 10° E., with an easterly underlay of 2½ft. in the fathom; their width varies from 1ft. to 36ft. On the surface the ore consists of carbonate of lead and at depth carries gold, silver, nickel, lead, zinc, antimony, iron, and sulphur. On the surface, and to a depth of 25ft., the carbonate yields 50 per cent. of lead, and 90ozs. of silver to the ton. Some recent shipments of ore sent to Europe averaged 52ozs. silver to the ton. The average percentage of the ore is, from near the surface, lead 50 per cent., silver 90oz.; from 30ft. to 114ft., a little lead, about 40 per cent. of zinc, and silver varying from 60ozs. to 302ozs.

The quantity of ore raised amounts to 600 tons in bags and 1,500 tons on the surface undressed. The veinstone associated with the metallic minerals is principally silica. The value of the ore is variable, some has realised in London £19 per ton. The ore occurs in shoots of carbonates or sulphides, striking southerly at an angle of 30° east. The workings consist of five shafts on the main workings, the deepest of which is 30 fathoms, or 180ft. Seven drives have been put in to the following distances—52 fathoms, 35 fathoms, 30 fathoms, 16 fathoms, 11 fathoms, 6 fathoms, and 3 fathoms, a total of 153 fathoms, or 918ft. Besides the main workings an adit has been driven for 312ft. to cut the main lode, but no ore has been cut at the end of the drive. Other adits have been driven and shafts sunk, but nothing payable has been met with outside the main workings, This mine is the property of, and is now being worked by, Mr. F. C. Singleton, to whom I am indebted for the foregoing information. (1887.)

THE ALMANDA MINE is situated about eighteen miles S.E. from Adelaide. In the year 1850 it was opened and worked as a copper mine, but not for long, as it was not productive at a shallow depth, and the capital of the company was not large. In 1866 the mine was examined, and from assays made of some stones left on the surface it was found to be poor in copper but rich in silver. Seven samples assayed by Mr. Elphick, assayer to the Burra Burra Company, gave results ranging from 44ozs. to 115ozs. of silver to the ton of ore; five samples assayed by Mr. W. Ey yielded from 25ozs. to 75ozs. of silver to the ton; three samples assayed by Mr. Thomas gave from 30ozs. to 75ozs silver per ton. In May, 1868, a mineral claim (No. 2759) was taken out by a few persons, and in June 4 tons 8cwt. of ore, crushed in a Chilian mill, yielded about 28ozs. silver to the ton. Later on amalgamating pans were tried, and by this process some 6,000ozs. of silver were produced. In 1870 fresh assays from various parts of the mine were made, and yielded results of from 57ozs. to 66ozs. silver to the ton, and about 5 per cent. of copper. At a depth of 16 fathoms in the engine shaft the lode assumed a hard character and contained barytes, quartz, silver ore, arsenic, &c. In 1877 the engine shaft was sunk to a depth of 21 fathoms, and assays from stone raised gave—silver, from 88oz. to 163oz. per ton; gold, from 1oz. 13dwts. per ton; copper, from 7½ per cent. to 16 per cent.; and from the western drive, off the engine shaft, 40oz. of silver to the ton, 4½ per cent. of copper. In 1881 the winze in Ey's tunnel was sunk to a depth of 76 fathoms, but the water came in too strongly to be kept under by hand labour. Assays gave 17oz. silver to the ton, and 16dwts. 8grs. of gold. The workings consist of two shafts of 21 and 16 fathoms, and a winze in Ey's tunnel, sunk to a depth of 76 fathoms. There are also two tunnels of 40 fathoms and 20 fathoms each, a dam, various buildings, and a furnace. The mine is not being worked at present.

THE AVONDALE MINE is situated about two miles S.W. of Mount Lyndhurst, and about seventeen miles S.E. of Farina railway station. Here there are four or more well-defined parallel lodes of almost pure galena without any vein stuff, traversing

the strike at right angles, of jointed and cleaved beds of quartzite, argillaceous slaty shale and schist. The lodes vary in width from a few inches to over 2ft.; they strike north and south (magnetic) with a high westerly dip. A shaft has been sunk to a depth of 100ft., and the galena is still visible in quantity, both in the shaft and in the outcroppings along the surface. Assays of five samples of ore from this mine were made by Mr. G. Goyder, jun., and the results were as as follows:—

No. 1 ..... 77 per cent. lead, and 5oz. 14dwt. 8gr. silver per ton.
No. 2 ..... 73 per cent. lead, and 4oz. 18dwt. silver per ton.
No. 3 (gossan) . 21 per cent. lead, and 7oz. 7dwt. silver per ton.
No. 4 ..... 67 per cent. lead, and 4oz. 14dwt. 7gr. silver per ton.
No. 5 ..... 72 per cent. lead, and 8oz. 1gr. silver per ton.

This mine is not at present being worked. The ore is easily raised, and a large quantity was sent to London, but the results were not considered payable.

Barritt's Mine is about a mile and a half north of Normanville and forty-eight miles south of Adelaide. The lode ran east and west, and was about 12in. wide. The underlay was north, and about 3ft. in 40ft. The silver-lead was in yellowish clay, and the ore contained about 60 per cent. of lead, and from 3oz. to 5oz. of silver to the ton. About twenty-five tons of ore was raised when first the mine was worked. It has been worked of late years by various people, but there is no available record of results. The ore was valued at £10 per ton in London, but the buyers complained of the way in which it had been dressed. One shaft was put down to a depth of 70ft., but the water level was not reached. A drive of about eight fathoms was put in. The ore occurred in blocks of almost pure galena, weighing as much as two hundredweight each, also in large crevices and in loose rocks. The lode ran from the surface to the bottom of the shaft.

Ben Lomond Mine.—No records obtainable. This mine was known as Chambers Mine.

Bugle Ranges, five miles east of Macclesfield and six miles south of Mount Barker. A mine in the neighbourhood has been found to yield silver, but not to any great extent. Very little work has been done upon it.

Campbell's Creek Mines are about two miles east from Cape Jervis. Lead has been found on the property, but no payable lode has yet been cut. The ore found was good, but was not in payable quantities. (Austin, 1863.)

Carrieton, Eurelia, Orroroo, Black Rock, Coomooroo, Walloway, McGee Springs, McCulloch, Eurilpa.—I inspected several localities near these places in July, 1886, where shallow shafts had been sunk on supposed silver lodes. Assays from some of these places are stated to have yielded from 4ozs. to 240ozs. of silver to the ton. After examination of the supposed ores, however, I was forced to conclude that the rich samples of ore sent down from the mines for assay were not taken from the places they were supposed to come from; or, if so taken, were enriched by the addition of silver ore or silver. No permanent, continuous, well-defined lode was seen at any of the claims. In some instances the supposed lodes consisted of bedrock alone.

Chambers Mine or Ben Lomond, ten miles south of Adelaide. No records obtainable.

Clarendon.—A mine was, at one time, opened here. There is a brown iron ore lode dipping S.E. A shaft 40ft. deep has been sunk in clayslate, and there are several other holes sunk along the cap of the lode. No records obtainable.

The Cumanilla or Cherry Gardens Mine is about twelve miles south of Adelaide. A shaft was sunk about 13 fathoms deep, and the ore raised is said to have contained a good percentage of silver and lead.

EUKABY.—Forty-eight miles east of Hawker a discovery of silver lead has been made by Dr. Stephens. Assays made for him by Mr. G. Goyder, jun., gave the following results :—

	Lead.	Silver, per ton. ozs. dwts. grs.	Gold, per ton. ozs. dwts. grs.
Galena yielded	60 per cent.	78 5 0	0 0 14
"	31½ "	15 17 0	0 0 22
"	44 "	15 4 0	0 0 6
"	70 "	77 1 0	1 14 16
"	62 "	35 8 0	0 4 14
Iron ochre and cerussite	—	0 3 6	0 3 2
Lead ore (black)	61½ per cent.	26 9 0	0 4 14
Ironstone and quartz ..	—	0 19 0	trace
Grannular lead ore	46½ per cent.	2 16 0	0 15 13

FINKE'S SPRINGS. (See MOUNT SERLE.)

FINKE'S MINE, Glen Osmond. Not much worked.

FRANKLIN HARBOUR.—MANGALO CREEK.—Near a hut on this creek thin veins of galena traverse mica schist and mica slate over a space of 40ft. to 50ft. in width. The galena is also found on the surface in the form of small rounded slugs. There are no workings, with the exception of a trench about six yards long and from 4ft. to 5ft. deep. The rock is soft and easily worked. The following are the results of assays made by Mr. G. Goyder, jun. :—

No. 1. Galena	2ozs. 9dwts. of silver	per ton
No. 2. "	2ozs. 9dwts. of silver	
No. 3. "	9dwts. 19grs. of silver	
No. 4. "	1oz. 15dwts. 22grs. of silver	
No. 5. "	16dwts. 8grs. of silver	
No. 6. "	2ozs. 15dwts. 12grs. of silver	

FROME WELL. (See MOUNT SERLE.)

GLENALBYN MINES.—Established 1850. 2,000 shares at £5 each. The property comprised four sections situated about one mile to the N.W. of Strathalbyn. In his article on the Strathalbyn mines, in "The Mines of South Australia" (1863), Mr. J. B. Austin evidently refers to the Glenalbyn Mine, though not by name. He mentions that 18 fathoms below the surface a fine lode of galena was found, the ore of which was said to contain 18½ per cent. of lead and 16½oz. silver to the ton. A shaft had been sunk about 30 fathoms, and the galena was impregnated with yellow copper ore. Several hundred tons of the ore were sent to England. The mine was lying idle in 1863.

THE GLEN OSMOND UNION MINING COMPANY was formed in London. Capital £30,000, in 3,000 shares of £10 each, paid in full. Operations were begun on preliminary section No. 295, four miles east of Adelaide, in December, 1846. Thirteen lodes were discovered, but work was confined to three for the time being. These were situated on the north and south extremities of the section and in the centre. Adits and levels were driven; winzes and four shafts were sunk. One hundred and sixty tons (including lord's dues), were shipped during eight months (March, 1848). Cartage, 7s. per ton; freight, 50s. per ton, free in London. This mine was at one time the property of Mr. Osmond Gilles. It was opened by him, and 200 tons of ore raised.

HAHNDORF.—A silver mine was opened here many years ago, but is not now worked. A quantity of ore was raised, and was said to be of rich quality. Pieces of quartz and reef formation, procured from this mine, were found to consist of a small percentage of galena, containing silver at the rate of 1½oz. per ton. Mr. W. S. Whitington, however, the original worker of this mine, has informed me that ore raised by his party was assayed by Mr. Cosmo-Newberry and by assayers in Eng-

land and Germany, and gave on an average 71 per cent. of lead and 21ozs. of silver to the ton. Operations were stopped by the flooding of the main shaft with water, and by the want of capital wherewith to obtain pumping machinery. The workings are in soft kaolinized clay, sandy and plumbagenous slates.

KANGARILLA MINE is about twenty-two miles S.E. of Adelaide. The workings consist of a tunnel 150ft. long, and a shaft at the mouth of the tunnel full of water. A trace of ore shows on one wall here and there, and a vein of galena and carbonate of lead, about 3in. or 4in. wide, extends for 20ft. or 30ft. along the bottom of the drive. The sinking is very hard, and the ore-bearing portion of the lode is very limited, so that, unless it can be shown to be very rich in silver, it would not pay to follow.

KANGAROO ISLAND.—At Western River there are some mineral claims traversed by a large lode showing a continuous outcrop for their whole length. It varies in width from 50ft. to 250ft., and bears about S.W. by N.E., and is composed of quartz showing in places galena and carbonate of lead. In one place the cap of the quartz has been broken through to a depth of 5ft. or 6ft. and a solid lode of galena disclosed 5ft. or 6ft. wide, and assaying about 78 per cent. of lead and 12ozs. silver to the ton of ore. At this point, on the surface, the lode shows a width of 150ft. (Captain W. H. Price.)

KEYNETON.—In addition to the North Rhine, Wheal William, and Wheal Alfred Copper Mines there are one or two silver-lead mines in this neighbourhood, but there is no record of work done or results obtained.

LOBETHAL, 27½ miles east of Adelaide. A silver mine was opened near this township many years ago. The lode runs north and south, and is composed of iron gossan, quartz, and mundic. A vein of cobalt and silver is said to exist in the same lode, being principally an ore of cobalt. (See under "COBALT.")

MACFARLANE'S MINE is in the neighbourhood of the Glen Osmond mines, and forms one of the same group. Very little work has been done.

MANGALO CREEK. (See FRANKLIN HARBOUR.)

MANNAHILL.—Seven miles south of this railway station a small vein of galena has been discovered; it is associated with gossan, quartz, and carbonate of lead, and occurs in bluish clayslates and sandstone. Three holes, the deepest 6ft., have been sunk, but no defined reef has been disclosed.

MOUNT SERLE, thirty-two miles S.E. of Leigh's Creek railway station. About one and a half miles east of Stuart's Waterholes a lode of rich galena and carbonate of lead has been discovered by Messrs. Marsh and Milte. It has been prospected two or three feet below the surface, and has a promising appearance. Between Finke's Springs and Frome Well galena and carbonate of lead have been found in three or four localities. The lodes are in the clay and calcareous slaty shale, the lode formation being calc spar and ferro calcite, with sometimes quartz and ferruginous gossan. These lodes are worth further prospecting.

The following assays, made by Mr. G. Goyder, jun., are from ores procured by me from these claims:—

	Lead.	Silver.
Cerussite, 1½ miles east of Stuart's Waterholes gave	58·5 per cent.	3oz. 9dwts. per ton.
Galena, same locality	65·4 "	1oz. 3dwts. "
Galena, from No. 2 claim, 1¾ miles west of Frome Well	70·0 "	8oz. 10dwts. "
Cerussite, from most westerly claim	70·0 "	7oz. 4dwts. "

THE OLD STRATHALBYN MINE adjoins the Wheal Ellen property. A shaft was sunk in the gossan for a depth of four fathoms without showing any signs of ore.

After that depth the gossan was found to carry gold and silver down to seven fathoms, when it began to make carbonate of lead. Sinking deeper the lode was found to be about 12ft. wide, and to be composed of sandy mundic, zinc blende, and galena of low percentage. A drive was put in at the 17-fathom level for a distance of five fathoms, and cut through about 10ft. of zinc blende and galena of about 20 per cent. of lead. At this level a counter branch was met with composed of white quartz, and galena free of zinc mundic and rich for silver. At the 22 fathoms level a change in the lode took place; the galena and zinc blende forming themselves into separate leaders. Specimens from here are said to have yielded 65 per cent. of lead, and 40ozs. of silver to the ton. The shaft was sunk seven fathoms below this level. There is no record obtainable concerning the amount of ore raised from this mine. It has not been worked for many years.

Oulnina, fourteen miles S.E. of Mannahill. Veins of galena have been found in various sinkings in this neighbourhood. (See Trinkalfena, &c.)

Paringa Mining Company. (See "Copper.")—A lode of black carbonate of lead was found on this property, in addition to the copper lode. (See the Wheal Margaret Silver-Lead Mine.)

Phillips' Mine, Rapid Bay, sixty-two miles S.W. of Adelaide, was opened in 1844. The lodes of lead were close to the surface, and are said to have yielded 75 per cent. of lead and about 23oz. of silver to the ton. After about fifty tons of silver lead ores were raised the work ceased through some cause not stated.

Provincial Mining Co., five miles S.E. of Adelaide. No records.

The Riversedge Mine, on the banks of the Torrens, thirteen miles from Adelaide, was worked for copper in 1847. A lode of silver lead was subsequently discovered, and an assay of the ore made at the time by Dr. Davy, showed the proportion of silver to be about 627ozs. to the ton of ore. The works were stopped for want of capital.

Robertstown Silverfields.—This locality is about twenty-eight miles from Kapunda, a little east of north. Early in the year 1886 a discovery of silver was reported, and from fifteen to twenty claims were taken out and worked. "Assays" were made and results varying from 3ozs. to 30ozs. of silver per ton were reported. Numbers of shafts were put down, one to a depth of 100ft. In May I examined the material raised from the shafts and the workings, and with two exceptions was unable to detect the presence of any metallic minerals, except iron ores and manganese. The exceptions were the Moonta claim and Murphy's claim. In the first there were small quantities of galena; and copper in the second. This, coupled with the absence of vein structure, led me to doubt the presence of silver in anything like payable quantities. I collected samples of the material from most of the workings and outcrops in different places, more especially from those points whence good returns were said to have been made by assay. These samples—twenty-two in number—were submitted to Mr. G. Goyder, jun., for assay, and out of the whole number only one—that from the Moonta claim—yielded any silver. The result was 13dwts. per ton. As far as I could ascertain, the men working in the mines had never seen any silver ore in the stone they had been raising, but depended altogether on the "assays," which encouraged them to continue. The mystery regarding the results given by the assayers will, most probably, never be satisfactorily cleared up. Much money, time, and labour, has been wasted in searching for a metal which, as shown by Mr. Goyder's assays, does not exist in appreciable quantities in this locality. (May, 1886.)

Sellick's Hill, one and a half miles east of Aldinga Bay, and five miles south of the township of Aldinga. Silver-lead was found in the hills about a mile from the

township. Some holes were put down, but no results have been recorded. The rocks are crystalline blue limestone, striking S.S.W. and N.N.E.

THE TALISKER MINE lies fifteen miles south of Normanville, and about three miles north of Cape Jervis. The mine was opened about June, 1862, and was worked till about June, 1872. There are four or five lodes, but only one—the Talisker lode—was worked. The bearings of two of them were N. 6° W., and of the others N. 40° E., and the average underlay was about 2ft. per fathom. The width varied from 6in. to 22ft. On the surface the ore consisted of arseniates, phosphates, and carbonates, and at 10 fathoms below the surface, galena. Some of the surface ore went as high as 200ozs. of silver to the ton, but the average of the mine was about 40ozs. silver. The veinstone associated with the metallic minerals is arsenical pyrites and quartz; in some places zinc blende. The country rock is crystalline schist. Seven shafts were sunk, the deepest being 432ft., and various drives were put in for a total length of 3,500ft. The ore was found intermixed with quartz, arsenical pyrites, and indurated slate; it was also found in shoots of various lengths and widths. These shoots dipped south at an angle of about 50°. The arsenical pyrites contained gold, silver, lead, iron, arsenic, and sulphur; and in some places blende, but none of these minerals were in sufficient quantity to pay for extraction.

The foregoing information has been supplied by Mr. W. H. Price, M.E., and the following is gathered from extracts from a letter in the possession of Messrs. Harry, Harvey, & Co.:—The proceeds of ore raised were about £16,000. The gross proceeds of silver-lead sold were £29,885 15s., ranging from £27 10s. 9d. to £39 16s. 6d. per ton of 20cwt. The average cost of freight, commission, and all other disbursements in silver-lead, sold in London, was 6¾ per cent. The quantity of silver-lead shipped was 939 pigs, and 30,593 ingots, the total weight being 889 tons 4cwt. 0qrs. 4lb. of 20cwt. to the ton. The percentage of silver contained in the lead, ranged from 62ozs. to 91oz. 13dwts. 20grs. per ton. The lead was sold at £16 12s. 6d. to £22 per ton; the larger quantity at £17 5s. per ton. The silver sold at 5s. 4½d. to 5s. 6d. per oz., the larger quantity at 5s. 5⅝d. The lead produced in 1870 contained an average of 69ozs. 12dwt. 11grs.; and in 1871 the average rose to 86ozs. 9dwts. 4 grs., being an increase of 23¼ per cent. of silver per ton of lead.

The mine stopped working for want of capital.

TRINKALEENA, about sixteen miles east of Mannahill. Several shallow shafts have been sunk on a small galena vein. The first and most northern of these is about 25ft. deep, on a leader composed of quartz, galena, and iron pyrites, 4in. or 5in. thick, stained with copper. The percentage of galena is small. The second shaft, 10ft. deep, is on a vein of galena, with gossany quartz, striking E.N.E. In the third shaft, about 25ft. deep, the vein of galena is larger and richer than that in the other shafts; the wall is also better defined. There are shallow shafts and holes in the neighbourhood, but no ore of importance appears to have been obtained from them. No work has been done for some time past.

WAUKARINGA.—A few miles westward of Blackfellows Reef galena was found in an excavation a few feet deep, on a ferruginous quartz lode. An assay showed that this ore contained 12ozs. 14dwts. 19grs. of silver to the ton.

THE WHEAL COGLIN MINE is forty-eight miles S.W. of Adelaide and three miles W.S.W. of Rapid Bay. Several shafts were sunk ranging from 7 to 35 fathoms in depth. About 70 tons of ore were shipped to England and sold at about £14 per ton. The lodes ranged from 6in. to 2ft. in width, and consisted of barytes, gossan, and silver-lead of good quality.

THE WHEAL ELLEN SILVER-LEAD MINE is situated in the Mount Barker district about thirty miles from Adelaide. It was opened in 1857 by private individuals, and was in active operation in 1860. It was worked for some time, but is now lying idle. The following account is compiled from papers supplied by Mr. John Harvey:—

The mine is situated on top of a hill 40 fathoms above the bed of the creek. The lode on the back is carbonate of lead for many fathoms in length, and rich in silver. It is from 4ft. to 5ft. wide on the average, and underlaying to the east about 2½ft. to 3ft. in the fathom; the shoots of ore dip north. The ground about the lode is soft white slate, a mixture of clay and mica, and very soft for working. Five shafts have been sunk, namely—Main Shaft, McCourt's Shaft, New Shaft, Corkscrew Shaft, and North Shaft. Three of them are sunk to depths of 20 fathoms, 60 fathoms, 40 fathoms, and a number of drives and levels have been put in. About £35,000 was expended on the mine up to the close of the year 1859, of which not more than one-half was for underground work, the remainder of the sum being represented by the purchase and improvement of the property and the building of smelting furnaces, miners' dwellings, machinery, &c., &c. The proceeds, during the same period, amounted to a net value in England of £20,000. The lode in the 40-fathom level in New shaft averaged about 2½ft. wide, and was composed of galena and zinc blende ores. Ores found in other shafts and workings were galena, zinc blende, mundic, auriferous gossan and carbonate of lead; also stains of blue and green carbonate of copper. In the North shaft, at a depth of 25 fathoms, a branch of rich copper ore, about 3in. wide, was met with, and at 26 fathoms the width increased to 10in., and consisted of red oxide, black oxide, and grey copper ores. During eighteen months' work about 2,000 tons of lead ore were raised, and yielded 90,000ozs. of silver. Specimens of the auriferous gossan, assayed by Messrs. Johnson & Sons, London, yielded gold at the rate of 4ozs. per ton, silver 45½ozs. per ton, and 59 per cent. of lead. The country rock consists of mica schist, micaceous sandstone, and quartzite.

Wheal Emma.—No records obtainable.

The Wheal Gawler Mine, Glen Osmond, adjoined the Wheal Watkins on the north. This was the first mine opened in the province of South Australia. The discovery of rich specimens of galena on the surface was the cause of the land being purchased and mined. Work was started in May, 1841, and several tons of very pure galena were raised. A considerable amount of work was done on this mine. In the *South Australian Register*, No. 242 of 1842, the result is published of an assay of ore from the lodes. The trial was made at Governor and Company's Smelt Mills, England, and the yield was as follows:—The dressed ore contained 77 per cent. lead and 19ozs. 4dwts. 4grs. silver per ton; the undressed contained 61½ per cent. lead and 19ozs. 2dwts. 4grs. silver per ton. The same journal published, on April 29th, 1848, an assay made by C. E. Schonne, Calcutta, of 107 slabs of bullion sent from the smelting works, Glen Osmond. The slabs yielded at the rate of 35ozs. silver to the ton, and one small one went as high as 70ozs. to the ton. The 107 slabs were the produce of the common carbonates, and the small slab was from the average ores.

Wheal Grainger, five miles S.E. of Adelaide. No records obtainable.

The Wheal Margaret Mine is in the Mount Barker district, and was originally a lease from the Paringa Mining Company, in 1848. It appears to have been worked up to the outbreak of the Victorian goldfields, in 1851. In the old workings it is apparent that a large bunch of ore was taken from about the 7-fathoms to the 15-fathoms level. At this point the lode was contracted to about 1ft. in width by a "horse" of exceedingly hard quartz. There is no record of the amount of ore raised during the first working of the mine. Work has been resumed of late years under the direction of Captain Price, and was continued for about six months. The following account is compiled from notes supplied by Captain Price:—There are three lodes, bearing from N. 10° E. to N. 5° W., and having an underlay of from 18in. to 2ft. in the fathom, in an easterly direction. Their widths vary from 2ft. to 12ft., and the ores are composed of galena mixed with zinc blende, and occasionally small strings of copper ore. The veinstone associated with the metallic minerals is a flinty

and very hard quartz, together with a flucan of chlorite on the hanging wall, with some veins of copper. The nature of the country rock is metamorphic slate. The ore, when properly dressed, will assay from 50 per cent. to 60 per cent. of lead, and 52ozs. to 80ozs. of silver to the ton. Thirty-five tons of ore, raised by Captain Price, yielded, on assay, from 45ozs. to 55ozs. of silver to the ton. Three shafts—the deepest being 15 fathoms—have been sunk to the water level, and the drives and levels extend about 200ft. The ore seems to occur in a shoot in one place, while in others it occurs in small veins of about 3in. thick.

It is stated in Parliamentary Paper No. 83 of 1860, that Mr. Jno. B. Neales first smelted lead by the Cumberland process at this mine in 1850. The first stampers used in the colony were erected on this property, and the first colonial-made pumps and lifters were used to keep the water under.

THE WHEAL MARY, an old silver-lead mine near Normanville. There are several shafts along a north and south line. In one or two places there is a little galena in calc spar. There is also some gossany iron ore in the limestone, apparently in cavaties. The bedrock is composed of limestone. (August, 1886.)

THE WHEAL ROSE MINE was amalgamated with the Wheal Margaret.

THE WHEAL WATKINS MINE, near Glen Osmond, four miles from Adelaide, adjoined the Glen Osmond Union Mining Company's property. It was opened in 1843 and remained steadily productive until the year of the Victorian diggings (1851).

WICKLOW HUT, NEAR FRANKLIN HARBOUR.—A shaft has been sunk here to a depth of about 30ft., on a decomposed granite dyke 3ft. or 4ft. wide. Thin galena veins have been cut, and can be easily worked as the rock is soft. The following assay was made by Mr. G. Goyder, jun.:—

No. 1.	Galena	1oz. 6dwts. 3grs. of silver	per ton.
No. 2.	"	1oz. 6dwts. 3grs. of silver	
No. 3.	"	1oz. 9dwts. 9grs. of silver	

WILPENA.—About two miles N.E. of Wilpena eating-house, fifty-eight miles N.E. of Hawker railway station, a mineral discovery was made some years ago. It was represented by a well-defined quartz reef from 2ft. to 4ft. thick. The crystalline quartz of the main portion of this reef is full of thin strings and small patches of galena; some of the patches are several cubic inches in size, and are, in some places, partially converted into carbonate of lead. This reef should be thoroughly examined, because lodes similarly composed at the outcrop have frequently been found to carry more valuable ores lower down, such as bournonite and tetrahedrite (Ulrich). This lode is probably the same as the one in which silver-lead ore has recently been found.

WIRREALPA.—A discovery of silver-lead ore has been made in this locality, twenty-five miles east of Blinman. Capt. W. H. James, of Blinman, considers it a most important discovery, and states that he has traced the outcrop for a distance of from three to four miles in a direct line. In places quantities of galena and carbonate of lead are visible. (1887.)

YATTAGOLINGA MINE. (See PHILLIPS' MINE.)

BISMUTH.

MURNINNIE MINE, containing bismuth and copper, is situated on the western shore of Spencer's Gulf, six miles inland. It is sixty-four miles south of Port Augusta, and 136 miles north of Port Lincoln. There are five lodes bearing north and south with little underlay. In width they vary from 1ft. to 10ft. feet, and the ores they contain are bismuth, copper, nickel, silver, and cobalt. The percentage of bismuth varies from 18 to 79 per cent., copper 10 to 20 per cent.

The country rocks consist of quartz, ironstone, and decomposed slate, and hard slate. Near the adit in the gully there is a little granite. Six shafts have been sunk, one to the depth of 30 fathoms, and two drives have been put in a distance of about 100ft. each. About 1,000 tons of ore have been raised, which is stated to be worth about £44 per ton in its natural state. The first indications of ore were found in a large block on the surface. The lode was then followed down for 12 fathoms at an angle of 45°, and at that depth a pocket was found containing 60 tons of ore. The winze below the pocket carried a lode 5ft. wide for a distance of 10 fathoms, then came a shoot of about 40 tons.

BALHANNAH MINE. (See under "GOLD.")

COBALT.

CARTOPE CREEK, near the Burra. Some mineral leases have been taken up here to search for cobalt. Several shallow tunnels and holes have been put in soft argillaceous and kaolinized sandstone, with limestone bands. The strike is north and south.

Cobalt has also been searched for at Gum Creek, near the Burra, and is found elsewhere in many of the manganese ores, but not in payable quantities.

LOBETHAL.—Within half a mile of this township (27½ miles east of Adelaide), a mine of cobalt and silver is said to exist. The lode runs north and south, and is composed of iron gossan, quartz, and mundic. (1867.)

IRON.

GUM CREEK, near the Burra. On section 427 there is a large excavation in soft argillaceous slaty sandstone, from whence iron ore and manganese have been taken out of a blow. (1883-4.)

MOUNT JAGGED IRON MINE is situated on the summit of the mount, nine miles S.E. of Willunga and eleven miles north of Victor Harbour. A small company was formed in 1873, and smelting works, consisting of a furnace 30ft. high, engine and blowing cylinder and the necessary sheds, were erected at a cost of about £2,500. These were placed five miles from Mount Jagged, upon one of the sources of the River Hindmarsh. Water and fuel were abundant, and also crystalline limestone. This was in huge boulders and of so hard a character that lithofracture had to be used in working it. The principal supply of ore was from the summit of Mount Jagged, 500ft. above the works. The mount is capped by a mass of black oxide, yielding 50 per cent. of pure iron and unmixed with any matrix. A vertical shaft was sunk to a depth of 70ft., and the ore held good all the way down.

Charcoal for the furnace was supplied at £2 per ton, and the ore at 12s. per ton. About 50 tons of iron were smelted, but, owing to the ignorance of the furnace-keeper, the furnace was frequently allowed to get cold and then had to be cut out. This so damaged it that at last it became unsafe to work, and there being no funds in hand to build a fresh furnace the company was wound up. The amount of capital subscribed was far too small for the proper working of the mine, being not more than £3,000. The cost of making the iron was reckoned at about £2 10s. per ton. (I am indebted to Mr. C. L. Dubois for the foregoing account.)

Scrubber' Camp, near the Burra Mine, has been worked as a copper mine, but a lode of iron ore runs through the property.

NICKEL.

Gill's Bluff, near Mount Lyndhurst, and thirty-six miles S.E. of Farina railway station. In 1882-3 the assistant geologist (Mr. Woodward) procured some specimens from this place of a metallic mineral occurring in veins of calcite in limestone shale. On being analysed it was found to contain a fair percentage of nickel. An assay by Mr. G. Goyder, jun., gave:—Nickel, 24 per cent.; antimony, 54 per cent. The discovery is an important one, as the ore is valuable, and the prospecting of the locality may lead to further results.

MANGANESE.

The Ellen Mine, twelve miles S.E. of Gordon.

The Etna Mine, six and a half miles N.E. of Gordon.

The Gordon Mine, eight and a half miles N.E. of Gordon.

Prout's Mine is near Scott's Mine.

Scott's Mine is situated between Orroroo and Hammond, on the railway.

Near Watt's Sugar Loaf, and about five miles from Gordon (Great Northern railway), a large deposit of manganese has been worked for some time. Blocks of ten to twelve tons of ore were found on the surface, and a considerable quantity was shipped to England.

Manganese and iron ores are common in many parts of the colony. The ore often contains cobalt, but not in sufficient quantity to render its working payable.

A private company—the "South Australian Manganese Mining Company"—has done a considerable amount of work in this locality. They began in 1882-3, and during 1886 the output of ore equalled 650 to 700 tons. An underlay shaft has been sunk to a depth of about 70ft. on a lode 10ft. thick, and another shaft is about to be put down. At the present time it is worth £3 10s. per ton gross for ore that is up to the standard of 70 per cent. of oxide of manganese.

Willowie Forest Reserve.—In 1886 a deposit of manganese was found in the Willowie Forest Reserve, about four miles north of Melrose. An analysis made by Mr. G. Goyder, jun., showed that the manganese contained cobalt varying in percentage from 1·7 to 2·31. No work has been done to test the lode.

During 1886, 1,200 tons of manganese of the declared value of £3 10s. per ton were exported from Port Augusta.

GOLD.

ALGEBUCKINA DIGGINGS. (See PEAKE DIGGINGS.)

THE ALMA GOLD MINE is situated in the Waukaringa district, sixty miles in a direct line N.E. from Petersburg, and about sixteen miles west of the Teetulpa goldfields. About the year 1872-3, a shepherd, whilst feeding his flock on the range of hills now known as Waukaringa, picked up some quartz in which gold was visible to the eye. He made known his find, and several companies were at once floated; but the only one that has really done anything to extensively develope any of the mines has been the Alma company. The expense of carting the stone to the Burra at that time was very great, owing to the distance, and the waterless character of the country. No less than £72,000 has been spent in working the mine, without the declaration of a single dividend. There are four lodes, bearing about 15° north of east, and underlaying south about 30°; in width they vary from 1ft. to 10ft., averaging about 5ft. The ore consists of arsenical pyrites, associated with carbonate of lime and quartz. The yield of gold to the ton varies from 10dwts. to 3ozs. Up to January 31st, 1887, the quantity of ore raised amounted to 11,907 tons, and has yielded 7,621ozs. of gold. This gives an average yield of 12dwts. 21grs. to the ton. Two shafts have been sunk, the deepest of which is 260ft., and the drives extend a distance of 1,600ft. The water level was reached at 160ft. The ore occurs in shoots and patches along the lode, extending about 200ft. in length.

From the surface the reef was composed of oxide of iron and quartz, and varied in thickness from 2ft. to 10ft. Free gold was visible throughout. A change from oxide of iron to sulphide, or arsenical pyrites, took place in the reef at No. 1 level. The gold is so coated with pyrites as to be undistinguishable. The works on the surface consist of two calcining furnaces, three amalgamating pans 15ft. in diameter, a forty-horsepower engine which drives the battery and pans, and a sixteen-horse-power pumping engine. A compressed-air rockborer is used in the levels. One great drawback is the want of water for the purposes of the mine, and fuel is also scarce. [Since writing above, three crushings of stone have yielded 926ozs. 5dwts. of gold.]

AUBURN GOLD MINING CO. (See BAROSSA.)

THE BALHANNAH MINE is on section 4024, hundred of Onkaparinga, and is distant from Adelaide fourteen miles, E.S.E., in a direct line. There is no information obtainable touching the early history of this mine. Local traditions agree in stating that it is rich in bismuth, gold, and copper, and large quantities of the first and last-named metals were got. It is also said that the gold was picked out and kept by the men engaged in dressing the ore. This statement is probably true in part only, and may be much exaggerated as to the quantity of gold taken. An examination of the spoil left on the surface, and lately tested by washing, shows gold to be present; and it is probable that rich shoots of that metal were met with when the mine was being worked. Alluvial gold is also to be met with in the immediate neighbourhood. Specimens of bismuth ore are easily to be got from the refuse heaps, and copper ores of all kinds are abundant.

The veinstone consists, near the surface, of gossan, iron ore, and quartz; lower down, of quartz, with carbonates of iron and lime, and pyrites. Two reefs have been worked. They strike north and south on the surface. The country rocks consist of kaolinized slate and argillaceous sandstone, striking N. 10° to 15° W., and dipping E. about 60°.

Mr. J. B. Austin has contributed the following note:—

The mine was first worked for copper, of which a considerable quantity was obtained near the surface. Bismuth was found associated with the copper, and the quantity increased, until it appeared likely to prove more valuable than the copper. Gold was found in the bismuth, and some beautiful specimens of small nuggets of pure gold in native bismuth were met with. Though the two metals were thus seen distinct from each other, they were smelted together, and the gold was afterwards separated, the precious metal being in the proportion of five ounces of gold to one hundredweight of bismuth. Cobalt in small quantities, also antimony and plumbago, are said to be found in this remarkable mine. The workings were carried down to a depth of fifty fathoms, where there is a

wide but dredgy lode, yielding about one ton of bismuth to the fathom, with some copper and gold. From £25,000 to £30,000 worth of copper has been raised from this mine, and about £7,000 worth of bismuth. Some exceedingly rich specimens of gold in ironstone gossan have been got out of this mine, and several nuggets, the largest weighing about 2½oz. A considerable quantity of white carbonate of iron is found in the mine.

The workings consist of a main shaft 300ft. deep, and two others to the westward. One of these has been sunk to a depth of 50ft., and the other to 120ft. The water in the main shaft makes at the rate of 8,000 gallons per hour. Levels have been put in at 60ft., 120ft., and 240ft. Several drives and slopes have been made from these levels. In the old workings the lode seems to have been very broken; but at the bottom drive, extending 150ft. eastward from the main shaft, the country seemed to be more settled.

The Banksia Mine is situated on section No. 4261, hundred of Onkaparinga, near Oakbank. Gold has been got from a series of more or less parallel leaders. These strike N.E. and S.W., and dip S.W. 45°, through metamorphic, granitic, and argillaceous rocks, associated with granite. The veinstone consists of quartz, cellular and ferruginous iron oxide, and micaceous iron. There is one shaft sunk to a depth of about 80ft. Fifteen tons of stone yielded about 11dwts. of gold per ton.

[Since writing above, I am informed by Mr. J. C. F. Johnson that in April a small crushing of nine tons gave 9ozs. 6dwts. of gold, and that assays of pyrites from the same claim have [illegible] as high as 10ozs. per ton.]

THE BAROSSA GOLDFIELD

is situated in the S.W. corner of the hundred of Barossa. The distance from Adelaide is about twenty-two miles N.N.E., and it is three miles S.E. of Gawler. The field was discovered in 1868 by Job Harris and mates; they found gold in the gully now known as Spike Gully. This gully is one and a half miles long—the prospectors' claims being near the centre. The depth of sinking was from 5ft. to 20ft. Some of the claims were very rich, yielding as much as £1,000 per man.

The rocks of the district are supposed to be of lower Silurian age, from their lithological resemblance to those of the Victorian goldfields. But from their highly metamorphic appearance, and no fossils having been found, it is impossible to say decidedly of what age they are. In several places intrusive granite dykes are met with, and in one particular line, from Malcolm's Creek to Mount Gawler, they are very frequent. These rocks consist of metamorphic, argillaceous, and micaceous schists, sandstones and grits, granite, gneiss, hornblend schists, mica schists, and quartzite, with granite, greenstone, and feldspathic dykes. As a rule they have a uniform strike of about 20° east of north, and dip to the eastward from 35° to 70°. There is an exception to this rule near the Bismarck diggings, where the dip is 70° west in two places, but this is probably caused by local agency, as it does not extend far.

The Barossa Deep Leads were the richest diggings then discovered in South Australia; they are situated at the head and down the sides of Spike Gully. The following are some of the most important:—

Victoria Hill, south-east of Spike Gully. The sinking was from 60ft. to 80ft. in depth, and as much as 11oz, 14dwts. of gold has been taken off the bottom of the shaft, the largest piece of gold being 7oz. in weight.

Hitche's Hill Lead, or Deep Lead, is a continuation of Victoria Hill Lead, but was not so rich. It, however, paid very well down to Water Flat, where there are some springs. Here the lead was lost, but lower down, where it ran into Walkervale Gully, it was again payable for a short distance. The deepest sinking—120ft.—was on the ridge at the head of Spike Gully.

The White Lead is situated between the head of Spike Gully and the road, and is cut through by several small gullies. The sinking was very hard, being nearly all composed of cement, with layers of sand between; and as the washdirt was also cemented, batteries had to be erected for crushing. Some of the cement yielded as high as 13oz. to 14oz. to the ton. The depth of sinking varied from 5ft. to 60ft.,

according as the shafts were situated either on the top of a spur or near the edge of one of the small gullies. The thickness of the washdirt varied from 2in. to 8in.

SIMMONS' LEAD lies between the heads of Spike Gully and Two-Speck Gully. It is evidently a continuation of White Lead.

RED HILL LEAD, between Two-Speck and Nuggety Gullies. It is a continuation of the two last leads.

GODDARD'S HILL is on a spur between Nuggety and Gollop's Gully. The lead splits in two, one point coming down the point of the hill, whilst the other goes into Gollop's Gully.

COTTIER'S HILL LEAD crosses Moonta Gully and Moonta Hill, in the direction of Yetti Creek. It started from the surface, going down into deep ground in ledges. There it was rich, yielding as much as 8ozs. to 9ozs. to the tub; but it gradually became poorer as it crossed the gully, and did not pay to work far into the Moonta Hill.

GREEN HILL LEAD, on the ridge between Green Hill Gully and Spike Gully, runs in a north-easterly directiou into the Red Hill.

EDWARDS' RUSH.—Two or three claims paid very well; but as the washdirt was cemented, it had to be crushed.

MELVILLE'S RUSH is situated about one mile from Williamstown. It starts on the main ridge, and winds down a small spur in the direction of Victoria Creek. The sinking was very hard, and the depth ranged from 15ft. to 20ft. All the washdirt had to be crushed, and, except in the case of one or two claims, did not pay well.

In PARRA WIRRA very little has been done in prospecting deep leads.

THE BISMARCK is the only one that has been worked. This claim is situated on the north side of Devil's Gully. The lead runs in a northerly direction, crossing several small spurs and gullies; but only one carried gold. The sinking was very hard, being mostly cement. The claim was never payable, although some small nuggets were found of from 1dwt. to 1oz. in weight.

THE ALLUVIAL DIGGINGS of this goldfield are very limited in extent, and seem generally to have derived their gold from the deep leads which they cut through. The most important on the Barossa side are:—

SPIKE GULLY, where gold was first discovered in soft ground at a depth of from 5ft. to 20ft. The gold was nuggety, ragged, and smooth. Some of the claims were very rich, a single one having yielded as much as £1,000.

TWO-SPECK GULLY paid to work from Spike Gully to Green Hill.

NUGGETY GULLY was very payable, and yielded nuggets up to 1oz. in weight.

GOLLOP'S GULLY was also very rich at the part where it spreads out into a little flat.

BULLOCKY GULLY was thoroughly worked, but was not payable.

MOONTA GULLY paid very well.

GREEN HILL GULLY paid to work for the distance of a few chains below Green Hill Lead.

HISSEY'S GULLY paid very well, although most of the washdirt had to be crushed. The depth of the sinking was from 15ft. to 30ft.

In PARRA WIRRA the alluvial diggings were of much less importance, only one gully having paid to work.

HAMLIN'S GULLY was rich immediately below the Lady Alice reef. The gold was large and rough, and the largest nugget found weighed 3ozs.

MARY'S GULLY.—A number of holes were sunk, but nothing payable was found.

There are two or three other places, such as Vixen's and Devil's Gullies, and at the diggings on the east side of Mount Gawler, where small quantities of gold have been found.

SIM'S RUSH.—Early in 1887 a fresh discovery of alluvial gold was made on sections Nos. 574 and 1103, near the junction of Spike Gully and Yetti Creek. The

gold is found in ordinary alluvium, increasing in depth to the northward, and also in an old "lead," being a continuation of that which was previously worked between Yetti Creek and Spike Gully. Some of the claims have been sunk to a depth of 25ft., but great difficulty is experienced owing to the strong influx of water. An extension of the "lead" may be looked for to the northward, where the surface indicates an area of similar "made" ground. Patches of this are found on many of the hills in the neighbourhood. The trend of the newer or alluvial "lead," now being worked in Sim's paddock, is probably down the Yetti Creek into the South Parra River. It is impossible to state the amount of gold obtained from these diggings, owing to the reticence of the miners, and the owners of the property. The rocks of the neighbourhood are white kaolinized clay slates, quartzose sandstones, and metamorphic granite.

BAROSSA GOLD REEFS.

A good deal of work has been done on these reefs, though with little success. In some instances this has been due to want of system; in others, where the prospects were good, the enterprise has been abandoned for some unknown reason; and in other instances again, payable shoots of gold have been left, and vertical shafts have been sunk, striking the reef in a barren part. In Barossa, the first auriferous reef found was

MOONTA HILL.—This, as far as worked, was not payable.

THE AUBURN GOLD MINING COMPANY took up some claims on Goddard's Hill, where they sank a shaft 110ft. At 60ft. they passed through some gold-bearing leaders, but these were not followed.

A shaft was sunk in 1869, by Mr. Gilbert, between "Two-Speck" and "Nuggety Gully," to a depth of 80ft. or 90ft., but no gold was obtained.

THE RED HILL GOLD MINING COMPANY, in the same year, sunk a shaft 120ft. on a vertical reef. At 70ft. they got good prospects and sent a crushing to Adelaide, but the returns were not so good as had been expected, and the mine was stopped. In 1882 the ground was again taken up. Three shafts of depths ranging from 60ft. to 70ft. were sunk, but without success.

BREAKELL & COMPANY, in 1875, put a tunnel 80ft. in length into Goddard's Hill, but got nothing. In 1882 they extended the tunnel to a length of 500ft.; they sank a shaft on Cotter's Hill to a depth of 100ft., and in driving to the west cut a flat reef 9ft. thick; but in neither case was gold obtained.

ROSEMAN & COMPANY, in 1882, took up some claims in Gollop's Gully, and opened out on a reef between 3ft. or 4ft. in thickness. They also sunk a shaft 40ft. on the same reef, and took out a crushing, but it was not payable.

MALCOLM'S BAROSSA GOLD MINE was discovered in 1871 by some men in the employ of Mr. Malcolm, of Gawler. It is a large vertical sandstone reef, about 15ft. wide, with small leaders of quartz. The main shaft was sunk 200ft., and at 80ft. a leader carrying gold and 20 per cent. of copper was struck. At the bottom of the main shaft a 200ft. drive was put in to the east, and a reef, non-gold bearing, was cut. Another shaft to the south of the main shaft was sunk 150ft. The mine has been stopped for some time, but the battery of eight stamps and other plant are still on the ground (1886).

THE VICTORIA GOLD MINE was taken up in 1884. From stone found on the surface, and crushed in a mortar, 35ozs. of gold were obtained. The reef was followed down 40ft.; a vertical shaft was sunk 150ft. to the east, but failed to cut it. A drive to the east through very hard ground is now (1886) being put in to meet it. There are two reefs here, one striking almost due north, and the other north-east; both dip to the east. Considering that such encouraging prospects of gold were found near the surface, it would have been advisable to have followed down the reef on the underlay, before proceeding to sink a vertical shaft. The prospects washed from stone taken from the reef were very good, and it is worthy of being tested in a

systematic manner. The rocks are feldspathic slates and schists, sandstone, quartzite, and grit.

In an official return made in 1871 by Mr. W. J. Peterswald, Warden of Goldfields, the value of gold found on this field, from 1868 to 1871 is estimated at £95,000.

A return made by Mr. A. M. Woods of the English, Scottish, and Australian Chartered Bank, and published in one of the daily papers, states the amount of gold bought by the Bank from October, 1868 to June 30th, 1870, to be 5,252ozs. 4dwts. 7grs. The price paid was at the rate of £3 17s. per ounce, and the total value represented was £20,221 0s. 6d.

Bertram's Reef. (See Echunga.)

Billy Springs are seventy-two miles east of Farina. About one mile south of the springs some digging has been done in shallow ground, having a limestone bottom, strewn with quartz wash from a large reef a little to the east. Gold has been found here. The samples seen by the Assistant Geologist were coarse and rough, and showed no signs of being waterworn. (1884.)

Bird-in-Hand Mine. (See Woodside.)

Bird-in-Hand Extended Mine. (See Woodside.)

Birthday Reef. (See Mannahill.)

Blackfellow's Creek Diggings were discovered about the 1st March, 1887. They are situated on section No. 292, hundred of Kuitpo, and about half a mile above the junction of Blackfellow's Creek and the River Finniss. On the 18th March about twenty men were at work on an alluvial flat in the creek. The sinking varies from 8ft. to 10ft. in depth, and is wet. The gold found is fine. There are wide alluvial flats, and a large extent of Crown lands is available for prospecting purposes.

Blackfellows' Reef is in the Waukaringa district. It is said to have yielded the coarsest gold yet found in this locality. The vein is very thin, and consists of quartz with carbonate of iron, iron pyrites, and oxide of iron in greenish clayslate and argillaceous sandstone. The proportion of gossany quartz and iron ore found in this and neighbouring reefs is considerable; the gold is found in both, in a finely divided state. The lodes are strong and extend for long distances, and will doubtless be found to continue to considerable depths when followed. (1883.)

Blacksnake Reef. (See Talunga.)

Blackwood Gully is an alluvial diggings situated on section No. 626, hundred of Kuitpo. It is thought to have been discovered by a Government prospecting party, about twelve or fourteen years ago. The gully has been worked for a distance of a quarter of a mile, and the sinking is shallow. At the upper part of the workings there are apparently several runs of gold, and at this point a wide area has been worked across the flat. Nuggets of moderate size have been found, and recently some very rich specimens have been got in Couch's claim. They were found at a depth of from 10ft. to 20ft., in a vein composed of quartz, gossan, and kaolin. In April, 1887, four and a half tons of stone were crushed by the New Era battery, at Woodside, and yielded 4ozs. 11dwts. of gold. The bedrocks are kaolinized clay, and sandy slates, sandstone, and quartzite, traversed by quartz reefs and veins.

It is probable that the alluvial gold has been derived from veins similar to those in Couch's claim, traversing the bedrock. The men are not working the alluvial to any extent, but are engaged in sinking on the reefs and veins.

This gully has been worked intermittently for several years. It is probable that a good deal of gold has been taken from it, but, in the absence of any records, it is impossible to form an idea of the amount.

Breakell & Co. (See Barossa Goldfield.)

BRIND MINE. (See WOODSIDE.)

BURGESS'S REEF, or the Koh-i-noor Mine, is on Kangaroo Island, and consists of a narrow leader of quartz in clayslate and schistose sandstone, &c. There was no gold visible in the quartz, but a faint colour was obtained from some that was crushed. Two men were at work in a 50ft. shaft, with an underlay to the west. (February, 1886.) One and a half tons of quartz were sent to Melbourne for treatment by the Virginia Co. and the United Pyrites Co., and yielded as follows:—40lbs. of pyrites gave 1oz. retorted gold, value £3 17s. 3d. The 40lbs. of pyrites tailings yielded 9grs. of gold—total 1oz. 9grs. (Gavin Gardner.)

BURTON'S MINE, section 6247, is in the district of Mount Torrens, twenty miles east of Adelaide. A shaft has been put down to a depth of 70ft. on a reef of micaceous iron and quartz, with gold. There is also a cellular silico-feldspathic dyke, from which stone crushed yielded 14dwts. of gold per ton. The reef and dyke strike east and west. (1885.)

CHAPMAN'S GULLY. (See ECHUNGA.)

COMET MINE. (See ECHUNGA.)

THE CRITERION REEF is near Mount Torrens, in the hundred of Talunga. There are two reefs, one striking east and west and one north and south. The north and south reef is not, at present, being worked; the east and west reef underlays to the north at a rather flat angle. In width it varies from 1ft. to 3ft., and is bunchy in character. This reef was worked many years ago, but the results were not payable, and the mine was idle for some years. Lately work has been resumed. A shaft has been sunk to a depth of 50ft., and a drive of 50ft. has been put in. Twenty-five tons of stone have been raised and have been crushed at the New Era battery, Woodside. The yield of gold was about 12dwts. to the ton. Information concerning the original operations conducted in this mine has not been forthcoming.

CUTAWAY HILLS, near the Leigh's Creek railway station.—I found here colours of scaly gold in prospecting the shallow alluvium. The ground should be further tried by testing the deep alluvium of the neighboring flats.

THE DURDAN MINE is on section No. 6343, hundred of Talunga. It contains one lode, bearing north and south, dipping easterly, one foot in five, and varying in width from 10ft. to 14ft. The ore is auriferous quartz; one hundred tons have been crushed, and fifty tons are at grass. It occurs in patches with fine gold distributed through the whole of the reef, and in some places in the surrounding country. The average yield of gold to the ton was over one ounce, value £3 12s. 6d. per ounce. The auriferous veinstone consists of cellular and solid quartz, penetrating a greenish serpentine granite which has intruded into metamorphic sandstone and micaceous slates.

One vertical shaft has been sunk to a depth of 100ft., and the water level was reached at 90ft. The drives extend a distance of 90ft. This property is not at present being worked; and what has been done upon it is not sufficient to accurately test the real value of the lode.

DUSCOVITCHES REEF. (See TALUNGA.)

EAST ALMA MINE, in the Waukaringa district.—One shaft has been put down to a depth of 120ft. There is no information as to what ore has been raised.

THE ECHUNGA GOLDFIELD.

This field was discovered in the early part of the year 1852. The following description is abridged from an interesting account of the discovery contributed

to the *Mount Barker Courier* by Mr. W. Chapman, who claims to be the first discoverer.—The first sign of gold was got on what was known as "the Company's land," not far from the old Wheatsheaf Inn. Mr. Chapman made known his discovery to his father and to Messrs. Hampton and Hardiman, men who were well acquainted with the country, and a thorough search was begun. Very rich surface gold was found by the party on land not far from the place where the first prospect had been washed. It was on the side of a hill above what is now known as Donkey Gully. The gold was traced from there to Chapman's Hill. At this place gold was found at the foot of a tree, laid bare by the dripping of water from the branches. Half an ounce was picked up by dry fossicking, and on the following day Hampton washed several ounces of gold from the roots of this tree. Before reporting the discovery the men carted away two or three dray loads of dirt in bags, and stacked it on Hampton's land. Subsequently, on being washed it yielded an ounce to the bag. By this time the people in the neighbourhood had begun to suspect that the Chapmans, Hampton, and Hardiman were getting gold, but it was determined that the secret should be kept until a claim had been made upon the Government for the £1,000 offered as a reward for the discovery of a payable goldfield. This offer was published in the *Government Gazette* of December 18th, 1851. Mr. Chapman, sen., and Mr. Hampton went to town for this purpose on August 23rd, 1852, taking with them about 7oz. of rough gold. At the Treasury they made oath that the gold had been found in the province of South Australia. On the day following a party of from fifty to sixty horsemen, headed by Mr. B. T. Finniss (Colonial Secretary), Mr. Chapman, Mr. Hampton, and a number of police troopers visited the place. Mr. W. Chapman was told to wash out some dirt in the presence of Mr. Finniss, and in order to render fraud more difficult of accomplishment he was made to take off his coat, and roll up his shirtsleeves. Mr. Chapman gathered up a dish of stuff from a part of the surface not previously touched, and began to wash it. He was closely hemmed in by an eager and excited crowd. Slowly the dirt was panned off, but no sign of gold was to be seen. The crowd became angry and impatient; they swore that the whole affair was a swindle, and expressed a strong desire to "lynch" and "string up" the prospector. But he was confident of success and of protection from the police. With a quick twirl of the dish the last of the dirt was shot out and the gleam of gold could be seen at the bottom of the pan. Thereupon a scene of great excitement ensued, and the shouting and noise was so great that horses tied to trees hard by broke their bridles and galloped away. The desire to wash for gold seized upon the people—saucepan lids, pannicans, kettles, cans, and even hats were made use of, and a little gold was found by all. Mr. Chapman washed out other dishes of dirt in the presence of Mr. Finniss, and from one of them nearly a quarter of an ounce of gold was got. Mr. Finniss returned to town carrying with him about half an ounce, and proclaimed the field to be a genuine discovery. The conditions of the reward were, that licences (at that time 30s. each) to the value of £1,000 should be taken out during the first two months, and that £10,000 worth of gold must also be found within the same period of time. In two months 684 licences were taken out, being equal to £1,026 sterling. The Messrs. Chapman, Hardiman, and Hampton applied for the reward after an interval of three months, but were not successful. There was no proof that £10,000 worth of gold had been obtained, except the statements made by diggers and storekeepers; these represented that £18,000 worth had been got. The matter was brought before the Council, and a sum of £500 was given to the prospectors, leaving the question of reward still open. Nineteen years ago two sums of £200 and £300 were paid for the discovery of gold at Jupiter Creek. Mr. W. Barker, a storekeeper on that field, bought gold to the extent of £3,000.

Chapel Hill and Windlass Hill contained basin-shaped hollows, filled with boulder and pebble wash, and were rich in gold. From the vicinity of these basins several small leads of gold started. Yorkey's lead was followed down into Wattle Flat, where it became too poor to pay for working. Sandy's lead started at the surface, and yielded from one claim, 8ft. square, 25ozs. of gold, and a nugget of 6ozs. in weight.

CHAPMAN'S GULLY was the one first opened on the field, and proved to be the richest; at one place some rich specimens of gold in ironstone were found. An ironstone leader crosses the gully, but has never been prospected (Dec. 1884). The depth of sinking at the upper part of the gully was from 6ft. to 7ft., and 12ft. at the lower part. The gully has been worked, and was very rich up to the private property (sec. 3893), and it is probable that that land contains a quantity of gold.

On the west side of Chapel Hill, gold was got at the surface; going westward the lead was found to pass over falls or precipices of 20ft., 15ft., and 10ft. in height, with flat spaces between. Where the bottom dipped towards these precipices there was the richest ground. They did not run straight; they were much cut under in places, and ran quite out at Bell's Point. The gold was patchy, with narrow connecting gutters. In some places these were very rich, prospects having been obtained of 12ozs. to the tub, and 5oz. or 6ozs. to the dish.

CHRISTMAS RUSH.—Here the sinking was soft, and varied from 30ft. to 40ft. in depth. The bottom was uneven, and payable gold was obtained.

IN POOR MAN'S GULLY and POOR MAN'S HILL the sinking was through hard gravel and cement, varying in depth from 1ft. to 30ft.; payable gold, and also diamonds, were found here.

NEW RUSH was discovered in 1858 or 1859 by a party of eight prospectors, who were rewarded by a grant of money from the Government. The prospectors also discovered gold at Blacksand Corner and at other places, which have since been worked. Two or three months after the first discovery, payable gold was struck, and yielded from 12ozs. to 14ozs. to the load of dirt. The gold was scattered along the foot of a precipice 10ft. to 15ft. high, on a flat bottom. The sinking ranged from 20ft. to 30ft. in depth, and was very hard, owing to the beds of gravel and cement.

DIAMOND GULLY.—A small quantity of gold was got in shallow ground; but it was not sufficiently rich to be payable.

SIMOND'S GULLY.—Three or four claims were payable. Professor Ulrich, in his report (1872), states that a great portion of the gold found in Felter's Flat and Chapman's Gully was not waterworn, but hackly and crystalline, a circumstance which indicates that, whilst the waterworn gold came from the denuded pliocene drifts, the hackly and crystalline were derived from the quartz reefs in the immediate vicinity.

THE ONKAPARINGA RIVER DIGGINGS were discovered in 1870 by Messrs. Scudds. The river flat was found to be auriferous as far down as Pennyweight Flat. The payable gold was found between the water-holes; some of these were pumped out, but very little gold was found in them. Seaman's Point was the richest part of the river; payable gold was also got at Blacksand Corner, and near Bigg's Flat; at Hack's Bridge also, it was discovered, but not worked.

BIGG'S FLAT.—A patch of rich ground was found here in 1877 by a Government prospecting party. The depth of sinking varied from 7ft. or 8ft. near the river to 36ft. at some distance from it. A good quantity of gold was got, of which the coarsest pieces weighed about 2oz. Native copper was found with the gold. Other places on this flat were prospected, but, as far as is known, no payable results were obtained. The sinking varied from 25ft. to 30ft. in depth, and was very wet. It is probable that other leads of gold are to be found on this flat.

HAHNDORF GULLY was discovered in 1856-7. The first payable gold was got by S. Jeffery, in about 7ft. sinking; higher up the gully claims were bottomed at 20ft. The gold was rough and rugged. A branch gully was worked in 1872.

SAWMILL GULLY, discovered in 1872 by Messrs. W. Hall and T. Lloyd, yielded nuggets, the heaviest of which were about 1oz. Gold in quartz was also found. The sinking was wet, and the depth ranged from 1ft. to 10ft.

SAILOR'S GULLY, discovered in 1872 by Messrs. Peterson and Watts. The lead of gold extended the whole length of the gully. The sinking was in hard and dry alluvium, and to a depth of from 6ft. to 15ft. The largest nugget found weighed 4ozs.

German Gully, discovered in the same year by Messrs. Lauchs and Muller, who had the richest claim. A ridge of rock in one of the claims contained copper.

Break-of-Day Rush, a small patch of surfacing, from which about £40 worth of gold is supposed to have been obtained.

Quartz Blow, Chapman's Gully.—Gold was found in leaders by the alluvial miners in 1855, the surface leaders being very rich. The National Company purchased the claim, erected machinery, and sunk a shaft 125ft. for water. Of this they got a good supply. In following the leaders down 30ft., a five-gallon bucketful of specimens is said to have contained £300 worth of gold. This company also prospected a large reef, but without any good results. On the ground again becoming open to miners, small patches of gold were got from time to time, and on the discovery of a patch rather richer than usual, in 1881, by R. and T. Hall, the claim was sold to two gentlemen, who formed it into a company, called the—

Echunga Gold Mining Company.—No. 1 whip-shaft was sunk to the water level, 90ft., and No. 2 shaft 70ft., with a drive, in which was cut a leader carrying gold. No. 3 shaft was sunk 50ft. in search of a leader in which gold had been found some years previously. The leaders dipped to the west until they came to what was known as the black leader. From this some good specimens were taken. Its thickness varied from 6in. to 16in. At a depth of 60ft. a large number of leaders were met with, averaging about 1in. thick. A crushing taken from a face of 7ft., in which were four leaders, went 2½dwts. to the ton; and a crushing of about forty tons from the leaders yielded about 50ozs. of gold. A deep shaft was sunk to a depth of 250ft., and at 230ft. a drive was put in north-west for 180ft., but nothing was found. A second drive was put in to the east 220ft., and a bunch of mundic and copper ore was met with.

Chapman's Gully Mine was started in 1881. The main shaft was put down 130ft., but no gold was met with. On a white quartz leader, a west underlie shaft was put down 40ft. It was driven on for a distance of 25ft., and a prospect of 2grs. to a dish was obtained. A second shaft, 44ft. deep, cut a gossany leader, dipping west, carrying gold. A third was put down on a white quartz leader carrying gold, and several other shafts were sunk to shallow depths.

South Echunga Mine, started in 1881; machinery was erected, and a main shaft was sunk to a depth of 180ft, but no reef was found.

Golden Reef Mine.—Three shafts were sunk to depths of 108ft., 110ft., and 50ft. The last one cut a leader at 25ft. which carried gold. The mine was started in 1882.

Chapel Hill.—There are a number of shafts sunk, varying in depth from 10ft. to 120ft. on various leaders, one of which carries a little gold.

Long Gully.—Three companies were formed in 1866 to work the cement (or conglomerate) in this gully, but no payable results were obtained.

The Queen Mine was discovered in 1871. Gold was found on the surface, in a leader which yielded 40ozs. of gold. Subsequently five tons were crushed and gave 5dwts. per ton. In 1881 the ground was taken up by a company. They erected a battery, and pumping and winding machinery; and sunk a shaft 100ft. deep, with a drive 100ft. west. A reef was cut 4ft. wide, bearing much mundic, and was driven along for a distance of 30ft. To the north of the main shaft, two other shafts were sunk, and were connected, at a depth of 25ft., by a drive 180ft. long; twenty-three tons of stone were crushed and yielded 4½ozs. of gold.

King Mine was started in 1881. An underlay shaft was sunk on the reef, to a depth of 120ft. At 71ft. the reef was 4ft. thick, and a drive was put in along its course, ten tons of quartz yielded 1½ozs. of gold; 250 yards to the east another shaft was put down to a depth of 50ft.; here the reef was 3ft. thick, and ten tons of quartz gave 1oz. of gold.

THE KANGAROO MINE was discovered in 1872, and a company was formed. A small crushing, taken from a westerly leader from 4in. to 6in. thick, gave gold at the rate of 2ozs. to the ton. A shaft 95ft. deep was then sunk, at 50ft. the reef was cut, and a drive south was put in a distance of 100ft.; a crushing gave less than ½oz. per ton. Another shaft was sunk 150ft., with a drive of 250ft., but no reef was cut. The mine was then abandoned. In 1881, however, work was resumed, and a crushing from the 95ft. shaft yielded ½oz. per ton. A main shaft was then sunk 100ft., and a battery and machinery erected. The works were then stopped, owing probably to want of funds. Six tons of quartz were crushed by Mr. A. von Doussa, at Hahndorf, and yielded 8ozs. gold; the stone was from a leader which pinched out on being followed.

COMET MINE.—An engine shaft was sunk 130ft., and an underlay shaft was put down on a reef of from 2ft. to 5ft. thick. 10ozs. of gold was got from the crushing of a few tons of quarts. Southwards 3ozs. were washed from four dishfuls of dirt. A crushing of ten tons gave 8dwts. per ton. Some prospecting was done in this mine during 1885-6, but no payable results were obtained. The machinery has been removed, and the mine is not at present being worked.

THE STIRLING REEF.—The first gold obtained was found on the surface by a man named Scudds. He showed it to Messrs. Bowes and James, and they began to work on the spot. Finding the gold was not alluvial they took up a reef claim, and after sinking to a depth of 4ft. came upon some gold-bearing leaders in the slate and greenstone. Good results were obtained by simply crushing and washing the stuff. Feeling, however, that they could do but little without capital, Messrs. Bowes and James sold their lease to an Adelaide company for £100 cash and 250 paid up shares. A five-stamp battery was put up, and work was continued for about twelve months. The profits were not, however, sufficient to cover the expenses and the work was stopped. During the next nine months tributors made very good wages in working it. The property then passed into the hands of the late Thos. Breakell. Five more stampers were added to the battery, and a tramway was laid from it to the mine. Crushing was carried on for about eighteen months and the mine was then abandoned. The material crushed, consisted of quartz and ironstone leaders, and a greenish soapy stone known as "green dyke." The richest gold was found in the last-named stone. The mine has been abandoned for a considerable time. The place where the work was carried on is marked by a large open cutting in grit, slate, sandstone, and conglomerate. The conglomerate is composed of kaolin and waterworn quartz, with mica and feldspar crystals. In the hard rocks, magnetic ironsand is plentiful, and quartz and ironstone leaders are visible to a small extent.

Professor Ulrich visited and reported on this mine in 1872. As regards its character, he did not consider it a genuine quartz reef, but more nearly resembled what, in Victoria, are called mullock reefs. He compared it to a large fissure, in places 30ft. and 40ft. wide, filled confusedly with masses of the wall rock-grit and slate. The interstices between these masses are filled with mullock enclosing irregular pockets and veins of quartz, through which rather solid crystalline specks of gold are distributed. Irregular veins cross the mass in all directions, horizontally, vertically, and obliquely. Consequently, as each vein cannot be separately followed, the reef has to be quarried out, and the stuff subsequently classed. This, besides being a troublesome process, is also one during which it is impossible to prevent a large quantity of poor matter getting mixed with the quartzose mullock, and thus producing the low yield of 2dwts. to 2½dwts. per ton average. There can be no doubt but that this reef largely contributes, by denudation, to the gold found in the Onkaparinga River. Professor Ulrich was of opinion that, on a large scale, the reef might be profitably worked, and that there was a chance of its becoming much better defined in depth.

THE VICTORIA MINE was discovered in 1872. The lode consisted of hard quartzite, interlaced with gold-bearing quartz veins. It was very rich near the surface. The deepest shaft was 70ft. to the water level, with a drive of 70ft. to the reef. Shafts,

trenches, and open workings were put in along the outcrop of a quartz reef striking north, and underlaying east, through quartzite, sandstone, and kaolinized clayslates.

THE VICTOR GEORGE MINE was taken up and worked in 1881, on a brown ferruginous leader dipping west, and from 1ft. to 2ft. thick. One hundred feet east of the reef a shaft was sunk 70ft., with a drive 100ft. to the west. Five tons crushed yielded ¼oz. to the ton. Other shafts and tunnels were put in on hard massive quartz veins in sandstone and quartzite.

BERTRAM'S REEF was taken up in 1872. The gold was first found in an almost flat bed of quartz, 13ft. wide, and 3ft. thick, splitting up into leaders southwards. Twelve tons of this stone yielded 3½dwts. of gold per ton; and 20 tons, from a depth of 32ft., gave 6dwts. per ton. Shafts and cuttings were put in on a large quartz reef in yellow sandstone, grit, and quartzite, with kaolinized clayslate in bands. The deepest shaft was 80ft.

LAWRENCE'S CLAIM.—Three shafts have been sunk to depths of 20ft., 28ft., and 35ft., at distances of 20ft. to 30ft. apart, and connected by drives. The country is soft, decomposed sandy and micaceous slaty shale, through which pass a number of small leaders. Near the surface these veins are composed chiefly of kaolin, becoming mixed lower down with glassy and ferruginous quartz and ironstone. In them, near the surface, some rich patches of gold were found, but owing to their number and irregularity, the run of the gold is difficult to follow. Comparatively little work has been done. There is no crushing apparatus, and the gold is washed out with cradle and dish. It is impossible to ascertain the total amount of gold found, the only certain information being that 41ozs., of the value of £157 16s. 10d., was sold to the Melbourne Mint through Mr. H. Hayman. This was shortly after the work was begun. The gold found is often in filaments; the largest piece when cleaned weighed 2ozs. The mine was discovered in 1884. In 1885 twenty tons of stone were raised and were crushed at the Ridge battery, Woodside. The yield of gold was 1oz. 6dwts. 6grs.

JACKMAN'S MINE.—Drives and shafts to depths of from 30ft. to 60ft. have been put down to prospect veins of quartz, ferruginous quartz, and ironstone, traversing quartzite grit and argillaceous sandstone. There are no well-defined walls, the formation being merely a collection of veins; some of them contain pyrites. In one of the drives a dyke-like mass of kaolin, with quartz and small veins of decomposed feldspar, with quartz and mica, has been cut, and might be prospected for gold with advantage. No quartz from this mine has been crushed, but it is estimated to yield from 5dwts. to 10dwts. of gold per ton.

JUPITER CREEK.—A claim was taken up in 1868 by Breckle & Co.; they erected crushing machinery and sank a number of shafts, ranging in depth from 50ft. to 100ft., and connected by a drive 474ft. in length. A reef was cut at a depth of 70ft., and a bucketful of the stone yielded 1oz. 3dwts.

PLANE & RIDDLE'S MINE.—The workings consist of an underlay shaft 110ft. deep, a vertical shaft of 20ft., and a drive of about 20ft. in length, put in an easterly direction from the underlay shaft at a depth of 70ft. The bedrocks consist of mottled kaolinized clayslates and sandy shales, dipping easterly. The reef from which the gold is procured is composed of an irregular dyke-like mass of soft decomposed claystone, intermixed with quartz, and a ferruginous gossany lode formation, with veins of kaolin. The amount of work done is very limited (1884). An excavation of irregular shape has been made where the stuff has been stoped out, judging by which about 20 to 25 tons have been removed and washed. This is said to have yielded 428ozs. of gold, some of which was in small nuggets. The underlay shaft has reached the water level at 110ft., and in it there is another reef lying more or less parallel to the one being worked. Adjoining and near to this claim there are several others which have been worked and have yielded small amounts of gold.

The above records have, for the most part, been obtained from men who were working on the diggings in 1884, and who were acquainted with the operations carried on by the various companies. It is noticeable that a small amount of work

only has been done in testing the reefs at a depth. Where deep shafts have been sunk the reefs met with have not been followed or worked in a systematic manner.

It is impossible to state the amount of gold obtained on the field since its opening. In a return made in 1871 by Mr. W. J. Peterswald, Warden of Goldfields, the value of the gold found during the first three years that the field was worked is estimated at £250,000.

The following return of gold bought by the English, Scottish, and Australian Chartered Bank, from May, 1866, to November, 1872, has been supplied by Mr. A. M. Woods :—

	Total oz.	dwts.	grs.	Total Value. £	s.	d.
Onkaparinga	777	13	2	3,003	18	0
Echunga and Jupiter	2,021	7	17	7,583	16	1
	2,799	0	19	£10,587	14	1

Echunga Government Prospecting Party.—Early in 1886 the Government decided to test the deep leads on Crown lands in the neighbourhood of Echunga. The first site selected was on sections Nos. 158 and 159, hundred of Kuitpo. Shafts were sunk, and the existence of a deep lead was proved. The washdirt consisted of waterworn quartz and other gravel, and was similar to that found to be auriferous in the old Echunga diggings. It occupied a watercourse of over 300ft. in width, and varied in thickness from 1ft. to 2ft. The bedrock was soft decomposed slate and pipeclay.

A drive of 260ft. was put in from the main shaft at a depth of 65ft., and was driven across the lead near its junction with the wash. The dirt was tested with the dish for the whole length of the drive. In appearance it was most favorable for gold, and there were all the indications usually found in similar drifts and well-defined gullies, and yet not a trace of gold was found. This is extraordinary, and probably is the first instance in which an old pliocene lead in a gold-bearing district has proved to be absolutly barren of gold.

The second site selected was on section 337 and others, adjoining hundred of Kuitpo, and about two and a half miles south of Echunga. Trial shafts were sunk across a wide extent of flat country and a lead was found. The deep ground had to be tested by boring, as the presence of drift sand rendered sinking difficult. Several bores were bottomed, but only a thin stratum of wash dirt was found. The drift sand made the boring exceedingly difficult work. As the bores progressed eastward the ground became deeper until the lowest depth was reached at 110ft. At this point the work was discontinued as the next bore would have come on private property. The manager of the party, Mr. G. Mellor, also reported that to sink a shaft through the drift sand that he had met with would cost £2,000.

Although the upper part of the lead has proved barren, yet the lower part towards the Meadows may be auriferous. But as the best sites for shafts are on private property, some time will probably elapse before anything is done to test the leads.

The Eclipse Mine is on section No. 80, hundred of Onkaparinga. The reef strikes north and dips to the eastward, and the bedrock, consisting of greenish clay-slate and sandstone, strikes north and south, and dips 45° east. Gold was found in it by a miner named Terrell, about the year 1875, and the place being prospected, carbonate of bismuth, showing gold, was found. This, on being assayed, is said to have yielded gold at the rate of 14ozs. to the ton. A small company was formed, and the reef was worked for some weeks. The results obtained, however, were not sufficiently good to justify a further expenditure of money, and the company dissolved. It was subsequently reported that the reef had not been worked at the spot where the best indications of gold had been seen. The section has recently become the property of Mr. Love, and work has been resumed on the reef. The results are reported to be exceedingly good. The country in the neighbourhood is favourable for alluvial gold in the gullies and surfaceings. (1883.)

THE ECLIPSE MINE EAST is on section No. 65. A shaft was being sunk here in the hope of cutting the Eclipse reef at a depth of 100ft. (1883.)

THE ELECTRA MINE is in section No. 2791, hundred of Kuitpo. Some shafts were sunk, but there are no records of results obtained.

EUREKA MINE. (See WOODSIDE.)

FOREST RANGE DIGGINGS are 16 miles N.E. of Adelaide, on the road to Lobethal, in the hundred of Onkaparinga. As early as 1854, gold was found in Stony Creek, section 514. The principal workings at present are on section 80, the property of Mr. James Love, and section 65, belonging to Mr. J. Baum. At the present time (March, 1887), there are from seventy to eighty men at work. The land is private property, and the owners charge 2s. 6d. per week for a claim measuring 30ft. x 30ft., to be worked by two men. The prospectors—Messrs. Biggs, Mason, and Norton, got 20ozs. gold from two loads of washdirt. They sank to a depth of 25ft. in a well-defined gully running into Stony Creek. A steep branch gully is also being worked, and one near the main road. The country rocks consist of greenish micaceous clayslate and kaolinized slates; there are also large quartz reefs with ferruginous cappings.

FOUNTAIN HEAD. (See WOODSIDE.)

GAWLER RIVER.—The upper branches of this river, known respectively as the North and South Parra, are auriferous, gold having been found along their courses. Very little prospecting has been done here, however, owing to the greater part of the ground being private property.

THE GERMAN REEF mine is situated on section 7118, hundred of Talunga, twenty-six miles N.E. of Adelaide, in a direct line. The reef shows a well-defined outcrop for over twenty chains in length. It strikes N. 15° E., and dips W. 15° N. The rocks traversed by it strike N. 40° E, and dip W. 40° N., and consist of highly micaceous metamorphic sandstone, alternating with mica schist. Gold was found in the outcrop for a distance of at least ten chains, and in two places was extremely rich. At one of these places, low down on the slope of a long hill, the reef has been worked on the underlay to a depth of about 40ft., and for a distance of about 100ft. in length. Tolerably well-defined walls show in the faces, and an alternately flat and steep dip. The thickness of the portion removed varied from 2ft. to 6ft., and the quartz became poorer in depth, the last raised averaging from 3dwts. to 5dwts. per ton. The second place where rich gold was found is on the top of the hill, but here the outcrop has only been partially worked. A vertical shaft was put down at this spot, and the reef was struck at a depth of 90ft. to 100ft.; but it proved to be poor, and was only 6in. thick, while on top it ranged in places from 2ft. to 5ft. All along the outcrop the quartz is rich in iron pyrites, and some, by its cellular texture and very ferruginous character, shows that much of this ore has been decomposed. The pyrites becomes still more abundant in depth, and fine seamy quartz raised from the vertical shaft contains it at the rate of 25 per cent. to 30 per cent. In similar cases in Victoria, namely the increase of pyrites and the decrease of free gold in depth, it has been found that the pyrites is payable, and sometimes richly auriferous. (Ulrich, 1872.)

This mine had stopped working at the time of Professor Ulrich's visit, but arrangements are now being made to work the ores under a system different to that hitherto pursued. A Frew ore concentrator is being erected for the purpose of concentrating the pyrites contained in the tailings after the ore has been crushed. The pyrites will be treated by roasting and chlorination for the extraction of the gold. Mr. A. Caudan, the manager, reports (March, 1887) that about fifty tons of highly ferruginous stone have been raised from a depth of 30ft. It contains limonite, and sulphides of iron. Gold often visible, but very fine, and yielding on assay from

1oz. to 3ozs. or 4ozs. per ton. At the north end of the section the stone carries fine grained oxide of iron, with magnetic iron and silver combined. In the oxide of iron the gold is of a coarse description. The dip of the reef is westerly throughout, but the angle varies in every few feet in depth.

The rocks forming the country are metamorphic quartzite and sandstone, mica schist, mica slate, and sandstone traversed by dykes of coarse granite. In 1870-1, the E. S. & A. C. Bank bought gold obtained from this reef to the extent of 395ozs. 13dwts. 5grs., equal in value to £1,527 2s. 8d. The Black Snake reef is being worked in conjunction with the German reef.

THE GRUNTHAL MINE is situated about a mile north of the township of Grunthal. There are two shafts, both nearly full of water. On the surface there are several buildings, including an engine-house. The veinstone raised consists of quartz, calc spar, and gossan, with iron and copper pyrites. The country rocks are clayslates and argillaceous sandstones, dipping east. The locality is a likely one for gold. No information concerning the past working of this mine has been forthcoming

GUMERACHA AND MOUNT CRAWFORD GOLDFIELDS

Lie about thirty miles N.E. of Adelaide, in the hundred of Para Wirra.

WATTS' GULLY, on section 111, hundred of Para Wirra, is the centre of operations, and was discovered in 1884, but was not generally known until about 1885. This gully was remarkable for the number of nuggets found, some of which were of considerable weight. One recently purchased by the Government weighed 14oz. 8dwts. The total amount of gold obtained is not known, but may be estimated at not less than 1,000 ounces. In addition to Watts', several other gullies have been opened up to the northward for a distance of two or three miles.

THE GUMERACHA GOLD VENTURE is situated in Dead Horse Gully, on the Gumeracha goldfields. This reef was found by Wallace in 1885; it strikes N. 20° W., dips west, nearly vertical. In places it is nearly 6ft. wide from wall to wall, but is not solid. There are two shafts. The northern one was sunk 43ft. on the reef, but as it was unsafe, another was put down to the southward to a depth of 37ft. The reef was not struck, the shaft being a little to the east of it; but at a depth of 15ft. a leader was struck. The intention was to sink 60ft. and drive to the reef, but work has been suspended. The rock is mica schist, striking north and south, and dipping east 50°. It is very tough to work in, and the difficulties are increased and large influx of water in both shafts.

PHILP'S UNITED MINE is at the head of Watts' Gully, Gumeracha. It was opened by Watts, 1st January, 1886. There are two shafts, with several costeens and pits. The first shaft, and the furthest up the hill, was sunk on a reef dipping to the west; the reef was cut at 14ft. from the surface and was found to be from 12in. to 18in. wide. The shaft was subsequently sunk to 52ft., and a 26ft. drive put in at bottom, but without result. No. 2 shaft was sunk lower down the hill and cut a reef 2ft. from the surface; at 13ft. a second reef was struck of a width of from 3ft. to 4ft. and striking S.W. and N.E. dipping N.W. 50°. At 37ft. a floor was cut, striking north and west, dipping W. 50°.

THE KAPUNDA SYNDICATE, WATTS' GULLY, Gumeracha.—This consisted of some claims taken upon the western side of Watts' Gully, near the fork, for the purpose of finding the vein from which the gold was supposed to have come. Fossicking amongst the quartz "blows" was first tried, but no gold was found. A tunnel was then put into the hill for a distance of 137ft., at a spot about half-way down from the ridge. The rock passed through was mica schist and segregations of quartz dipping to the east, but no reef was found. Operations were suspended.

THE KAPUNDA SYNDICATE had other claims at the head of Blood and Thunder Gully. A shaft has been sunk and various cuttings made, but no reef was found.

THE GUMERACHA SYNDICATE.—This claim is situated across Watts' Gully, close by the fork, and covers all the ground where the heaviest gold (alluvial) was found. A tunnel has been put in 86ft. into the eastern bank of Watts' Gully and the reef cut. There is also a shaft sunk through mica schist to a depth of 60ft. in the eastern branch gully; two small leaders containing mundic were passed through, but no reef of any size was struck.

HUTCHINSON'S CLAIM, Gumeracha, between Watts' and Snake Gullies. There is a small reef striking S.W. and N.E., dipping west, containing mundic, and from which some fair prospects were obtained at the surface. A shaft was sunk, and at 15ft. went through the reef; it was carried down to 40ft. in the hope that the reef would turn and dip in an easterly direction. The claim is now abandoned.

HANNAFORD'S REEF, Gumeracha, is a large reef running in north-easterly direction, dipping to the west. A series of shafts have been put down close together along the whole length of the outcrop, besides numerous pits and trenches. The mine was worked many years ago, but no records are obtainable.

THE ADELAIDE SYNDICATE, Watts' Gully, Gumeracha.—The first shaft was put down on the eastern side of the gully. When the solid ground was reached a drive was put in under the gully with the idea of cutting a reef.

The second shaft was put down on the top of the hill to a depth of 80ft. Two very small leaders were cut, but no reef.

AVENUE GULLY, GUMERACHA GOLDFIELDS.—On the western side of this gully are three or four old shafts. One is about 50ft. deep, and has been timbered, but the timbers have become rotten and unsafe. There are two reefs, one solid white quartz and the other ferruginous quartz and gossan; they strike north and south, and dip 70° or 80° west. The rock is mica schist.

INGLEWOOD MINING COMPANY.—Gold has been found at Inglewood, fifteen and a half miles from Adelaide, in a north-easterly direction. The only information obtainable concerning the results is, that during June, 1870, the E.S. and A.C. Bank bought 7ozs. 15dwts. of gold obtained there.

JACKMAN'S MINE. (See ECHUNGA.)

JUPITER CREEK. (See ECHUNGA.)

KANGAROO MINE. (See ECHUNGA.)

KING'S BLUFF is near Olary railway station, on the Petersburg-Cockburn railway. A discovery of gold was reported to have been made at this place on the 4th March, 1887. Godfrey Mellor, the prospector, got 8grs. of gold to the dish of dirt by washing. His claim is situated at the foot of King's Bluff, in a dry creek running into a gully a quarter of a mile wide and about two miles in length. A rush of from 300 to 500 men took place, but, though the prospectors are said to have obtained an ounce of gold for their first week's work, the results as a whole were not encouraging. In common with the Teetulpa field, the want of water is much felt, and owing to this the place cannot be properly tested.

KING'S MINE. (See ECHUNGA.)

LADY ALICE MINE. (See PARA WIRRA.)

LADY EDITH MINE. (See PARA WIRRA.)

LAWRENCE'S CLAIM. (See ECHUNGA.)

MCVITTIES HILL. (See TALUNGA.)

MALCOLM'S BAROSSA GOLD MINE. (See BAROSSA GOLDFIELD.)

THE MANNAHILL REEFS

Are about eight miles W. 10° N. of Mannahill, and eighty miles east of Petersburg.

THE BIRTHDAY LINE.—On the prospecting claim, McEvoy's, several shafts and excavations have been made. The first is 14ft. deep, and has been sunk on a large quartz and ironstone reef, about 4ft. thick, striking E.N.E. in clay and calcareous cleaved slates. The stuff for crushing consists of ferruginous quartz, quartz, iron ore, and gossan, with a little iron pyrites. A cutting has been made in the middle of the claim across the veins. The largest of these is 2ft. thick, and they underlay S.S.E. In a cutting towards the east, small specks of gold were to be seen in the stone raised; 6½ tons of stone from this place, mixed with 1½ tons from Gibson's claim further eastward, was crushed at Waukaringa, and is said to have yielded 15ozs. of gold.

GORDON AND STIRLING'S claim adjoins McEvoy's on the east. There are some excavations on the reefs ranging from 12ft. to 15ft. in depth, and a shaft 30ft. deep on a reef from 2ft. to 3ft. thick at the bottom, where it shows a large amount of gossan.

HAYCOCKS' CLAIM adjoins Gordon and Stirling's. An underlay shaft has been sunk 28ft. between two quartz and gossany quartz veins, 3ft. apart. Two other leaders show at the bottom of the shaft, underlying S.E. 45° to 50°. A trial crushing of 5cwt. was obtained from two holes near the shaft, and yielded 14dwts. of gold. Some work has also been done on C. Smith's and Ivey's claims.

GIBBONS & COMPANY.—The specimens shown to me by the proprietors contained the coarsest particles of gold I saw on the field. The workings consist of an underlay shaft 34ft. deep, on a vein of ironstone and quartz, 1ft. wide at the bottom. A second underlay shaft has a depth of 27ft., and exposes a reef of from 1ft. to 2ft. thick at the surface and underlies at an angle 70° S.S.E.

GOSHEN CLAIM.—Four or five shafts have been sunk to a depth of from 8ft. to 10ft. A number of other claims have been pegged out to the eastward.

CHRISTMAS DAY CLAIM (Roberts & Co.) has an underlay shaft 65ft. deep, at an angle of 55° to 66°. The reef ranges in width from 6in. to 12in. In addition to brown iron ore and ferruginous and white quartz, the reef contains mundic; small specks of gold are sometimes visible in the stone. On Moore's and Padmore & Co.'s claims work has been done.

All these claims adjoin along the reef, and extend for about one mile in an easterly and north-easterly direction. In some places the reefs conform to the bedding of the rock for a short distance, at others they cut across it, and apparently fill up fissures made by faults in the strata. The rocks consist of clay and sandy slates, claystones and calcareous clayslates. Their general strike is E.N.E., and the general underlay S.S.E. The veinstone is composed of hard, glassy, and white quartz, with cavities containing gossan, ferruginous clay, iron oxides and pyrites, and admixtures with these of quartz. The gold occurs in fine particles, and is generally contained in the iron ore and siliceous ferruginous rock, though sometimes seen in the quartz. The gold has doubtless been derived from the decomposition of the pyrites. Owing to the nature of the veinstone it is difficult to see the gold previous to the stone being crushed and washed.

AURORA AUSTRALIS MINE.—The best reef lies to the northward of, and almost parallel to, the Birthday Reefs, at a distance of 20 to 30 chains.

ROBERTS & CO.'S CLAIM.—Holes have been sunk in three or four places on large reefs and bows of quartz and iron ore, and a shaft has been sunk to a depth of 30ft. on a large reef of quartz, iron ore and gossan, together with a considerable quantity of iron pyrites. At the bottom of the shaft the reef is from 3ft. to 4ft. wide, and dips slightly to the north. Two other, though shallower, shafts have been sunk.

ELLIOTT AND CLARK'S CLAIM.—Two shafts have been sunk—one, 12ft. deep, is on a reef 12in. to 18in. wide, striking N.E. by W. The other is 20ft. deep on a

vertical reef, 12in. to 18in. thick. Pyrites is here associated with the oxide of iron. Various other claims have been slightly worked.

THE ELSIE MAY REEF has been prospected in several places, and from two places trial crushings have been taken. The veinstone is composed of iron oxide and gossany iron ore, and, at the eastern end of the reef, it lies almost flat on the top of a low spur. It crops out to the surface northward, and dips gradually southward, where it has a steep inclination. The thickness of the deposit varies from 12in. to 18in. Twelve tons of ore crushed at Waukaringa are said to have yielded a good prospect of gold.

NO GAMMON REEF is situated about five miles N.W. of Mannahill. A number of of holes, shafts, and cuttings have been put in on the reef for a distance of about twenty chains.

THE NECTAR CLAIM is half a mile north-westerly of the No Gammon, on a north-easterly line. There are no less than six shafts within a distance of fifty yards. The first is 18ft. deep; at 6ft. from the surface a flat vein of ironstone was passed through. The second is 14ft. deep; here gossany ironstone veins intersect the hard calcareous slates and limestone rock. The third shaft is 9ft. deep; the fourth and fifth each 15ft. deep. In all these, ironstone leaders or veins traversed the joints of the bedrock. The sixth shaft is 20ft. deep; 6ft. of quartz reef was passed through. The rocks are hard and broken. The ironstone leaders cut across the bedding of the rocks, whilst the quartz reef just mentioned conforms more or less to the bedding.

From this claim 2 tons 8cwt. of ore was smelted at the Intercolonial Smelting Works, Spotswood, Victoria, and yielded gold at the rate of 2ozs. 17dwts. 3grs. to the ton, and 2 tons 6cwt. crushed at Waukaringa averaged 2ozs. 11dwts. per ton.

THE TROJAN MINE contains two lodes bearing east-north-east, underlaying to the south, and varying in width from 2ft. 6in. to 4ft. The ore is gossan and ironstone, and about twenty tons have been raised. Four and a half tons have been crushed, and yielded at the rate of one ounce of gold to the ton. The ore occurs in veins and shoots, which vary in width from 2ft. to 3ft., and dip to the south-west. Four shafts have been sunk, the deepest of which is 60ft., and drives have been put in for a total length of 130ft. A vertical shaft to strike the reef, and with the hope of finding water is now being sunk. (E. F. Troy, secretary.)

The stone found on this field is composed of hematite, quartz, brown iron ore, iron pyrites, ironstone, and gossan, and it is difficult to see the gold without crushing and washing. Eleven samples, consisting of gossan, quartz, pyrites, and tailings, were assayed, and, with the exception of two, were found to contain gold; thus showing that gold is widely distributed. The best assay was from the No Gammon Mine, the stone yielding gold at the rate of 19ozs. to the ton. In November last, 10 tons of stone were taken from five different claims and sent to Melbourne. They were treated by the Newberzy-Vautin process, and the results were as follows:—Two tons from the Aurora Australis gave 2dwts. 5grs. per ton; 2 tons from the Eagle's Nest gave 2dwts. 13grs. per ton; 2 tons from the Star of the East gave 6dwt. 7grs. per ton; 2 tons from the Nectar gave 13dwts. 4grs. per ton; 2 tons from the Westward Ho gave 2ozs. per ton. Value per ounce at the Mint, £3 14s. 9d.

Stone from the Nectar and Westward Ho was, with other samples, also sent to the Ballarat School of Mines, and yielded the following results:—Westward Ho, 5dwts. 7grs. per ton; Nectar, 5dwts. 2grs. per ton. Twenty-five tons from the Westward Ho, since crushed, in the ordinary manner, yielded 29oz. 17dwts. of gold, valued at the Mint at about £2 17s. 11d. per ounce.

The extent of country occupied by these reefs is large, and the reefs are numerous, well defined, and are persistent along the strike. The rocks they traverse are similar to those found to contain auriferous veins in other parts of the colony.

MID ALMA MINE, in the Waukaringa district, has one shaft about 200ft. deep, from which about 50 or 100 tons of ore have been raised. The percentage of metal has not been tested, but is not considered rich.

MINT MINE. (See WOODSIDE.)

MONTACUTE MINE.—This mine is mentioned under the head of "COPPER," but it is said to have also yielded gold. Concerning this, however, no information has been forthcoming.

MORIALTA, FIFTH CREEK.—Gold is being found in gullies on the Morialta estate, at the head of the Fifth Creek, in the hundred of Adelaide. It is of peculiar character, being frequently found in flat pieces, bearing serrated feather-like markings. The owner of the land has lately bought 50ozs. of gold from the diggers, but there is every reason to believe that this represents but a small proportion of the quantity found.

MOUNT CHARLES. (See WOODSIDE.)

MOUNT CRAWFORD. (See GUMERACHA.)

MOUNT FITTON, 76 miles east of Farina. A quartz reef lies about two miles south-east of the trig. It contains hematite and gossan, and yields specks of gold on being crushed.

The basin-shaped area around Mount Fitton appears to be a locality favourable for gold prospecting, both in the reefs and alluvium. (1884.)

MOUNT MAGNIFICENT.—Gold has been found on section 209, hundred of Myponga, near the River Finniss, close to the boundary of the hundred of Kuitpo, and two miles in a W.N.W. direction from Mount Magnificent. At a spot twenty chains east of the river, and 150ft. up the slope of the hill, a large quartz reef crops out. A tunnel has been driven 43ft. into the hill about 10ft. below the reef. Here there is a lode formation of from 2ft. to 3ft. in thickness, and from which quartz has been excavated for about 16ft. The reef strikes north and south, with an underlay of 45° east. North and south of the tunnel it bends round in the shape of a horseshoe. The quartz generally is very ferruginous. Good prospects of rough gold were obtained from stone taken from the tunnel and the outcrop, and crushed in a mortar. No fine particles were found. Besides the tunnel, there are one or two other excavations on the outcrop to the south and north of the same line. The reef is large and well defined. This is the prospectors' claim. On Mincham's claim a tunnel of about 75ft. has been driven along a small reef, having a south-easterly underlay, and composed of white and ferruginous quartz. Several shallow holes have also been sunk along the same line. No gold was to be seen in the quartz. This is a distinct reef from the prospectors', and is higher up the hill to the S.E. An attempt was made by a small company to work these reefs, but they were abandoned before much work had been done, or before any payable results had been obtained. Since then various shafts have been put down, and tunnels driven, but no valuable discovery has been made. Until better surface indications can be found it is useless to continue to sink shafts on the mere chance of finding a payable reef.

Alluvial Gold.—At a spot directly on the boundary of Myponga and Kuitpo a few yards square of surfacing has been prospected for gold. A trial washing yielded four or five specks. Since then nothing worth mentioning has been done, though the first prospects were fair. By making a race from the Finniss river a short distance above this point, water could be brought on and sluicing made use of during several months of the year. The expense would not be great to men who understood the work.

MOUNT PLEASANT DIGGINGS. (See PARA WIRRA.)

MOUNT'S VENTURE is on section No. 4107, hundred of Onkaparinga. In January, 1887, gold was found on the cap of reef on the section, and a small com-

pany was formed for the purpose of testing it in depth. The reef strikes nearly due north and south, with an underlay to the east. It can be traced on the surface of the ground for some distance. A shaft has been sunk to a depth of 63ft., and at 31ft. a crosscut has been put in. This showed the reef to be 18ft. wide. Assays taken from here yielded gold at the rate of 2¼oz. to the ton. At 63ft. drives have been extended north and south along the reef. So far, however, the existence of a defined and continuous shoot of gold has not been proved. The reef consists of ironstone, with veins of quartz.

Mount Victoria Mine is about two miles S.W. of Mt. Victoria, in the N.E. district. Prospecting for copper ore was carried to a depth of about 20ft. The lode contains specular iron, carbonates, red oxide, and sulphides of copper, and iron pyrites. The lode strikes N.W. and is about 2ft. wide. The country rock consists of porphyritic granite, and the lode lies in a soft decomposed granitic dyke. Gold occurs in the green carbonate, the quartz, and the iron oxide in coarse and fine specks. The lode is worth testing for gold to a depth much greater than that at present reached (1883).

Myponga.—In May, 1886, the Government equipped a party of eighteen men to prospect for gold in the hundred of Myponga. They began operations on section No. 287, on the Meadows Creek, half a mile from its junction with the Finniss, but obtained no indications of gold. At a point somewhat lower down a line of shafts, varying in depth from 5ft. to 17ft., was put across the creek; gold was found in most of the shafts, but not in payable quantities.

The eastern slope was tried within 100 yards of the creek, and a fair prospect was found in 4ft. sinking. In one shaft a small patch yielded about 1oz. 10dwts. of rough gold. Around this shaft a great number of others were sunk to depths of from 4ft. to 30ft., but no payable gold was found.

A little distance below the junction of the Finniss and Meadows Creeks some holes were put down to depths of 11ft. and 14ft., but greater depths could not be reached owing to the incoming of water; some specks of gold were met with in the drift. Four hundred yards below this point a line of shafts was thrown across the river, and two distinct runs of gold were struck. The report of the overseer of the party does not mention whether the quantity found was payable.

Near Mount Compass shafts were sunk from 3ft. to 40ft. deep, and gold was found in nearly all. In the 40ft. shaft it was found at 17ft. on a false bottom. From that depth the sinking was through sand cement on to a granite bottom. Other trial shafts were put down in the neighbourhood of Mount Compass without result.

Holes were also sunk down the river to about 300 yards below where Blackfellows Creek joins. Specks of gold were found in most of the holes. From here the party returned to their starting-point on the Meadows creek, and prospected northwards.

Signs of gold were obtained in nearly every gully, but not in payable quantities. In Cooper's Gully a good prospect of shotty gold was got, but operations were greatly retarded by the large amount of water met with. At Lantern Flat, about one and a half miles north of the starting point, the party prospected places where two long gullies come into it. Some of the dirt yielded from 2dwts. to 3dwts. of gold per load.

Prospecting operations were not carried beyond this point, as the party was disbanded. The details, as given above, are from a report made to the Warden of Goldfields by the overseer of the prospecting party.

Nest-Egg Mine. (See Woodside.)

New Era Gold Mine. (See Woodside.)

New Venture Mine. (See Woodside.)

Onkaparinga Diggings. (See Echunga.)

PARLIAMENTARY CLAIM. (See WOODSIDE.)

PARA WIRRA GOLD REEFS.

THE LADY ALICE GOLD MINE is situated in Hamlin's Gully. The main reef strikes about 10° east of north, and underlies to the east; but it is either split by a "horse" or crossed by a smaller reef, which underlies to the north-east. This smaller reef carried the rich stone, both in gold and copper, the latter in the form of sulphides, oxides, and native copper. The only place where the spur reef came to the surface is on the north side of the gully, and it was at this spot that the gold was first discovered. When the deep vertical shaft was sunk, this reef was passed through at 30ft., but the sinking was continued to 160ft., and the main reef was struck at 100ft. Three levels were put in from the shaft to the junction of the reefs, at 50ft. and 100ft., and again at 160ft. A rise was carried up 400ft. on the spur reef to a point on the hill a little to the S.E. of the main shaft. From this the mine was subsequently worked. The upper part of the reef has all been stoped.

The captains who at different times had charge of this mine did not know the country, and devoted most of their time to working the main reef. This, except at the junction, was very poor in gold; and the spur reef, consisting of payable stone, was worked by tributors. The mine has at present (1886) water in it to within 14ft. of the surface; but it is said that the 6-inch pumps now in the mine are capable of keeping it under. The mine was discovered in 1881 by G. Goddard, who with three men sunk a shaft to a depth of 40ft., and obtained some very good quartz. A company was formed, but failed to make the mine pay. During six months of 1874 the mine was worked on tribute, and yielded 1,149ozs. 19dwts. 21grs. of gold. The value of the copper produced at the same time was £208 2s. 8d. From the floating of the company in 1873 to its winding up in 1879 the value of the gold obtained was £22,000, and of copper £4,000. The bedrock in the neighbourhood has a general strike of north and south. It consists of gneissic granite, feldspathic schist, quartzose, and micaceous and hornblendic schist, yellow feldspathic rock, with quartz in rounded pieces. Gneissic granite is the prevailing rock.

THE TRY AGAIN MINE is on the north side of the creek, and is a continuation of the Lady Alice reef. At this point it splits into a network of leaders, three of which are the principal ones. In 1871 G. Davy and others found a rich patch of surfacing, beneath which were gold-bearing leaders. These were followed down to a depth of 40ft., when copper ore was met with, associated with gold. A company was formed, winding and crushing machinery was erected, and a shaft was sunk 250ft. Several small leaders were struck by cross-cuts from this shaft, one of which, a foot in thickness, contained copper ore and gold. The mine is now abandoned.

THE HAMLIN MINE is on the same line as the Lady Alice and the Try Again Mines, but is on private property. A network of leaders were met with, but all too poor to work. Two or three shafts have been sunk to the north, but no payable quartz found.

THE LADY EDITH MINE is to the south of the Lady Alice, on the main line of reef. The shaft was sunk 260 feet, through very hard granitoid and gneissic rock, but the reef did not carry a payable amount of gold.

THE GODDARD, on the same line, has a shaft 160ft. deep. A drive was put through slaty granite and gneissic rock to the reef, but no gold was found.

THE SMITHFIELD is another mine on the same line of country, and worked without success.

THE TIECA is at the head of the Lady Alice claim in the northern branch of the gully. There is no reef visible, and the claim was probably taken up as a speculation. A drive was put into the hill for a distance of 200ft. or 300ft., and a shaft was sunk in the gully to a depth of 70ft. in slate rock. No reef was cut.

THE ALLADIN is situated higher up on the same branch, but on the east side. A shaft was sunk 50ft. or 60ft in slate, with a drive on a reef at the bottom, from which good prospects are said to have been obtained, but for some reason the stone was never tried.

THE EXCELSIOR is at the head of the same gully, and the stone from a hole on the cap of the reef is said to have yielded 8dwts. to the ton. There are two shafts, each 70ft. to 80ft. deep, and connected by a level at the bottom. They are sunk in a soft, decomposed slate, which near the bottom becomes blue and very hard. Some small ironstone leaders were cut in the south shaft. The quartz is very barren-looking and frequently contains a good deal of mica.

THE YOUNG AUSTRALIAN is an amalgamation of four claims. It is situated on private property, just below the Lady Alice mine, and between Hamlin's and Wild Dog Gullies. There are three principal parallel reefs. The one nearest the Lady Alice is named the Young Queen, and was opened up about fifteen years ago. Two shafts 20ft. deep were sunk, and a cutting in very hard slaty rock was made; but though good prospects were obtained the work was discontinued. The reef strikes first 10° east of north, then north-west.

Upon the next reef, the New Year's Eve, a shaft was put down 20ft. in yellow slate. The reef is small, but has veins containing much fine gold. Very good prospects and specimens were obtained, and a trial crushing at Woodside is said to have given 12dwts. to 16dwts. per ton.

YOUNG AUSTRALIAN No. 1 has been worked from a cutting and a shaft 30ft. or 40ft. deep. The reef is from 4ft. to 5ft. in width, and is well defined. It contains manganese, native copper, copper pyrites, galena, baryta, calcite, carbonate of iron, and iron pyrites. It was rich on the hanging wall, and contained coarse, almost nuggety gold. Several other shafts have been put down, the deepest being 26ft. Forty tons of stone were crushed at the Lady Alice battery, but the results were not made public. The rock is an altered sandy clayslate, dipping 45° east.

YOUNG AUSTRALIAN No. 2 adjoins the New Year's Eve claim on the north. It includes a flat in Wild Dog Gully, from which a good deal of alluvial gold was got. A hole was sunk on a network of ferruginous quartz leaders, which proved to be very rich in gold. One piece, nearly all gold, weighed 16dwts., and as much as 1oz. 3dwts. was got from a prospect crushed in a mortar. A shaft was sunk 44ft. in settled ground to cut the reef. It is large, glassy, and crystalline, often much iron stained, but carries no gold.

YOUNG AUSTRALIAN No. 3 is situated to the north of No. 1. The reef is 16ft. wide, and has been worked by a large excavation to a depth of 20ft. A crushing of five tons went 12dwts. to the ton.

Mr. F. C. Singleton states that £1,400 worth of alluvial gold was got from the sections comprising the "Young Australian" property.

THE PEAKE GOLDFIELD.—In September last I examined and prospected a place on the Neales river, pointed out by a man named Biddle, who had found gold there some years before, and was anxious to further test the place. The locality is at a waterhole called Algebuckina, about sixteen miles north of the Peake telegraph station, where the track crosses the Neales. Only a few colours of gold were obtained at the time, and it was impossible, owing to the height of the water in the river. to prospect the most likely places. Biddle was therefore provided with a month's rations, and left to continue the search as the water became lower, and succeeded in striking payable gold soon after. A number of men have worked on the field since then with varying success. According to the latest official report, under date of March 2nd., 1887, the number of men at work is about twenty-five; and, as far as can be ascertained, about 60ozs. of gold have been got since the field was opened. During eleven weeks' work a party of three men got 13ozs. of gold; this appears to be the richest result obtained. Colours of gold have been found over

an area of country extending from Cadnowie Springs to Coppertop Hill, a distance of 35 miles.

The extent of country available for prospecting is comprised within the Dennison, Peake, and other ranges to the northward, which outcrop in isolated areas from beneath mesozoic plains, and along the courses of the Neales and other rivers where they have cut into the bedrock. The auriferous area is therefore comparatively limited.

PLANE & RIDDLE'S MINE. (See ECHUNGA.)

QUARTZ BLOW. (See ECHUNGA.)

QUEEN MINE. (See ECHUNGA.)

RED HILL GOLD MINING CO. (See BAROSSA GOLDFIELD.)

RIDGE GOLD MINE. (See WOODSIDE.)

SEBASTOPOL MINE, in the Waukaringa district, has one shaft 100ft. deep, but there are no results to record.

SELLICK'S HILL, hundred of Willunga, five miles south of the township of Aldinga, and thirty miles south of Adelaide. A reef on the surface was reported to contain gold. An adit about 30 yards in length was driven from a gully about 200ft. below, but as the reef was not cut the work was abandoned.

STIRLING REEF MINE. (See ECHUNGA.)

HUNDRED OF TALUNGA.

TALUNGA, HUNDRED OF.—Gold has been found here on private and Crown lands.

Section 6511.—Small patches of surfacing were worked in a shallow alluvial gully. During the last five months of 1885, Messrs. Facett and Garland obtained 126ozs. 10dwts. of gold, equal in value to £504. No work is now (Feb., 1886) being done owing to want of water for washing. Three or four shafts have been sunk on the section to prospect quartz lodes, but with what result could not be ascertained. The prevailing rocks are mica schist and quartzite, with coarse granite dykes and quartz veins.

Section, 6558.—From a small patch of surfacing, 77ozs. of gold, value £305, was obtained. Numerous shafts have been sunk in prospecting for the reefs, and quartz from one of these is said to have yielded 9½dwts. of gold to the ton.

PENRYHN MINE, section 6332.—Rich surfacing was got here. Shafts were sunk on quartz reefs in the vicinity, but no payable stone was found.

BLUMBERG UNITED MINE, section 6572, was being worked in February, 1886. Shafts have been sunk on several veins and reefs, and some surfacing has also been done.

SECTIONS 6396, 6624, 6625, and 116 have also been worked for alluvial gold. Those of the sections which belong to the South Australian Company yielded the following amount of gold:—

	ozs.	£
Section 6625	Gold 58	Value 232
" 6624	" 199	" 796
" 6558	" 77	" 305
" 6511	" 414	"1,648
	748	£2,981

MOUNT PLEASANT DIGGINGS.—Sections 1287, 1288, 1289, &c., are Crown lands, and are situated about one mile south of the township of Mount Pleasant, from which the diggings derive their title. Two long gullies have been worked for alluvial gold, and several shafts have been sunk on the bedrock in prospecting for quartz reefs. The works were carried on about nineteen years ago, and it has been impossible to get information respecting the total amount of gold procured. However, Mr. Dutton, manager of the bank of South Australia, Mount Pleasant, states that from February, 1870, to July, 1883, 729ozs. of gold from this field passed through the bank. The E. S. & A. C. Bank bought 360ozs., value £1,374 17s., during the same period. Alluvial gold has been found in—

SECTION 6572 and in section 1673, adjoining the section in which the Durdan Mine is situated.

McVITTIE'S HILL, section 1340.—Here two or three shafts have been sunk on a quartz reef; their depths range from 40ft. to 60ft. The place was worked about seventeen years ago, and the yield of gold per ton is said to have been 10ozs. 11dwts. Gold can be seen in some of the fragments of quartz lying near the shafts. This mine was known as McLean's Triumph.

Numerous reefs in this hundred (Talunga) have been prospected by shafts, and near the surface nice specimens of gold in quartz have been obtained; but none of them appear to have been prospected to any great depth, not more than 100ft. probably.

THE BLACK SNAKE MINE, on section 127, hundred of Talunga, was worked during a few years. It was taken up on the strength of some good specimens being found along the outcrop of the reef. Some of the stone was crushed, and is said to have yielded well. The reef runs E. 30° N., dipping to the west. Two timbered shafts were put down, and cut the reef at 60ft.; they were connected by a drive, and one shaft was, for some reason, sunk 30ft. deeper. An engine shaft was sunk 50ft. and timbered, and some shallower shafts were put down. This mine is now being worked in conjunction with the German Reef. On

ELDER'S SECTION, No. 125, a 40ft. shaft was put down at the junction of two reefs, one of these is about 2ft. wide, well defined, strike S.W. and N.E., dipping N.W. 45°. The other is a solid white quartz reef, striking S.E. and N.W.

DUSCOVITCHE'S REEF is on section No. 6339. A few years ago rich specimens of gold were found in a quartz reef about 3ft. wide.

On section 1673, Aboriginal Reserve, and on section 6343, hundred Talunga, alluvial gold has been found.

THE TEETULPA GOLDFIELDS.

Are situated about fifteen miles east of Waukaringa, and about twelve miles north of the Birthday reef, at Mannahill. They were discovered by Thos. Brady, of Lancelot, and Thos. Smith, of Broughton, on October 5th, 1886. The first gold was found in the centre of the gully now known as "Brady's." Several pieces, weighing in all about 1½ ozs., were dug out of the cracks in the slate by Smith, using his knife only. The prospectors then travelled to Waukaringa and made a declaration that they had found a payable goldfield, putting in, at the same time, their claim to the Government reward of £1,000.

From the moment the news reached Adelaide a rush to the field set in, and great excitement prevailed throughout the colony. The working population numbered at one time about 4,000 to 5,000 people, but at the time of writing (February, 1887) this number has decreased owing to the want of water on the field and the prevalence of enteric fever. The prospectors took out their reward claims (ten in number) at the spot where they had found the first gold; other claims were quickly pegged out, following the creek in a northerly direction for a distance of half a mile. The first

nugget of any size was found by McDougall and Opperman, and weighed 8oz. 14dwts. The largest nugget known to be found on the field was got by Horner in a claim about twenty yards north of Brady's claims: it weighed 29ozs. 15dwts. Other nuggets of 14ozs. 16dwts., 13ozs., 10ozs., and smaller sizes were found more frequently. Work on the field was hindered by the want of water—all the dirt had to be carted to Tonkin's Well, a distance of about two miles. The results from washing were variable, ranging from one or two dwts. up to four ounces per load of dirt. For a time the digging was confined to the bed of the creek, where heavy floods had washed away the earth to a depth of four feet. Here the claims were easily worked; as a rule the earth and gravel were broken up by the pick and then fossicked over with a knife. Every gutter and crevice in the slate beds was carefully cleaned, and it was in these that the nuggets were most frequently found.

About the 27th October, however, some holes were put down on the high ground on the west side of the watercourse. Here the sinking was from 18ft. to 25ft. deep. A good wash was met with about 18in. from the bottom, and in many claims the yield was very rich indeed. This locality was named Windlass Hill. From one claim the owner states he got £700 worth of gold during a period of five or six weeks, and afterwards sold his claim for £50. On the 31st October a rush took place to the upper part of the gully, south of the prospectors' claims. This was caused by a man finding a 15dwt. nugget, together with 5dwts. of small gold. This part of the gully had been tried previously, but nothing had been found in it. This discovery, however, put more heart into the miners, and the gully was soon tested in every part. It proved to be very rich. Nuggets weighing from 14ozs. downwards were found in many claims, and some of the washings were very good. Here the sinking averaged about 8ft. The gully was not more than four claims broad; the gold lay in gutters and pockets, and from one of these as much as 19ozs. has been taken. In November a rush set in on

Goslin's Gully, lying east of Brady's Gully, running north and south, and joining Brady's about half a mile below the prospectors' claims. This place had been prospected for three weeks, but had yielded nothing more than fair prospects.

On the 9th of the month, Hugh O'Kane struck a pocket containing about 24ozs. of rough nuggety gold, the largest piece being about 4ozs. This was at a depth of 5ft. The gully was at once pegged out, and soon proved to be as rich, if not richer, than Brady's. Nuggets of good size, from 11½ozs. downwards, were obtained, and the washings were extremely good, many of them going 7ozs., 4ozs., 3ozs., and 1oz., to the load of dirt. This may have been due partly to the fact that the men in Goslin's Gully did not dry fossick to the same extent as did those in Brady's Gully.

Langford and Gadd's rush set in on a spot about a mile and a half north of Brady's claims, and about fifty yards west of the watercourse. The sinking was from 18ft. to 25ft., and it was thought to be a continuation of the lead from Windlass Hill. Some of the men got fair prospects, but not sufficiently good to pay for cartage of dirt to the well for washing. This rush has been worked intermittently. Gold has also been found in

Dam Gully, coming into Brady's from the west, south of Windlass Hill. Six-ounce and smaller nuggets were found in claims on the high ground north of the watercourse. The sinking averaged 20ft. in depth, and the gold, as in the other gullies, was very patchy and irregular.

Strawbridge's Gully was opened early in November. It lay south of Brady's, and ran in a north-easterly direction, emptying near Tonkin's Well. It was a most likely-looking place for gold, and was worked for some weeks. One man obtained a pocket holding over 6oz., including a nugget of 5ozs. 5dwts.; but, with that exception, nothing more than fair prospects were obtained. Later on a rush set in on

Brennan's Gully.—This was south of Strawbridge's, and lay parallel to it. Here the prospectors found a sample of fine gold—the only one found on the field. Other men found a few grains, but the gully was soon deserted.

Flack's Gully came next. This joined Brennan's gully, and good prospects were got, but nothing very payable.

WAKEFIELD GULLY ran into Brennan's also, but, above the prospectors' claims. Not very much work was done here.

ROCKS.—The bedrocks consist of clay, and calcareous clay, and sandy slates, and limestones, much cleaved and jointed. They strike in an easterly and westerly direction, with an undulating and variable dip.

PLIOCENE LEADS.—Northwards of where Brady's Gully runs on to the Salt Creek Flats there is a table-land of drift, known to diggers as "made ground," similar in character to that of Para Wirra, Barossa, Echunga, and other parts of the main range. It is most probable that gold will be found by prospecting it. Work has been done here and "colours" are said to have been obtained, but operations have been suspended, as no payable results were quickly forthcoming. This drift extends northwards towards Mount Victor, in the neighbourhood of which there are gravel-capped rises indicating its presence. It may also pass under the Salt Creek alluvial flats.

The ranges near Bumbumbie—to the east of Brady's Gully— consist of gneiss, mica schist, granite, &c., and these are penetrated by granite dykes and masses, and probably by diorite, as this and other hornblendic rocks are seen in the creeks. The calcareous slates and limestone dip away from the granite and metamorphic rocks at a low angle. Some of the slates contain boulders and pebbles of quartzite imbedded in them. A large portion of the nuggets found on this field show no sign of having been derived from quartz reefs. Most of them are partially coated, and have their hollows filled, with travertine limestone; ferruginous limestone rock and iron oxide is frequently found adhering to them. The veinstones found in the district consist chiefly of quartz, iron ore and limestone also occur, either combined or separately. Auriferous wash dirt, cemented with carbonate of lime, is also found; it is a hard rock, and the gold is not visible on the surface. Payable gold may sometimes be past over, if the cement is not carefully examined. There is also a probability of small nuggets becoming completely coated with the travertine limestone, and so being passed unnoticed. This material may be removed from the gold by placing it in a solution of spirits of salt, or by heating it in a fire and converting the carbonate of lime into quicklime.

The following is a list of nuggets bought by the Government. It includes the heaviest pieces found on the field up to the present time.

Where found.	Weight. oz.	dwts.	grs.	Price paid. £	s.	d.
BRADY'S GULLY.—Three claims north of prospector's claim....	29	15	0	120	0	0
" " "	21	8	0	80	4	0
" " "	19	7	5	78	19	7
" " "	13	12	22	51	3	0
" " "	8	14	0	34	16	0
" " "	10	9	0	41	16	0
" " "	3	7	18	13	11	0
" " "	3	12	2	13	10	4
" " "	3	3	12	11	17	0
" " "	1	10	0	5	12	6
" South of prospectors' claims	14	13	8	55	0	0
" "	9	2	0	34	2	6
" "	6	6	18	24	11	1
" "	4	0	0	15	10	0
" "	3	12	2	13	10	4
" "	3	3	12	11	17	0
" "	1	4	8	4	17	4
" Windlass Hill	10	8	6	41	13	0
" "	10	1	0	40	4	0
" "	8	6	18	33	7	0
" "	4	9	8	18	8	6
" "	2	12	11	10	9	10
GOSLIN'S GULLY.....	11	9	19	45	19	0
"	7	19	11	31	17	10
"	7	1	12	28	6	0
"	5	4	16	20	18	8
STRAWBRIDGE'S GULLY	5	3	15	20	14	6

With regard to the amount of gold got on the field it is difficult to form an estimate. But Mr. Cowle, manager of the E.S. and A.C. Bank, kindly supplies the information that from 22nd November, 1887, to 15th April, 1887, the bank bought 10,571ozs. of gold. Large amounts were also bought by the local storekeepers.

THE TEETULPA REEFS.—There are two sets of reefs or veins in this district; one traversing the bed rock in an east and west direction, and the other striking in a meridional direction. They are composed of veinstone consisting of quartz, gossan, carbonates of lime and iron, hematite, brown iron ore, and iron pyrites. Carbonate of bismuth and lead, with traces of copper ore, have also been noticed. So far the greater part of the work done has been on the north and south reefs. These have a strike ranging from north 10° to 15° and 20° west; the underlay is steep, and inclines from 70° to 80° to the east. They are well defined, and are of considerable width in some of the claims, and have well defined walls. They run parallel to one another in groups of three or four, Numerous shafts have been sunk, the greatest depth at present attained being about 70ft. As a rule the gold is very fine, and, owing to the ferruginous nature of the stone, is very difficult to see. In the Victoria claim, however, a pocket consisting of quartz and gossan has been found containing very rich specimens of a wiry, filamentous gold of a peculiar and remarkable character. Other claims in which gold has been seen are Meache's, Ironclad, No. 1 and 2; and on the Ironclad belt of reefs, the Jubilee, Blue Star, Warrior, &c. Owing to the nature of the stone its value cannot be judged merely by examination, and so far no crushings have been made. Assays and hand crushings have been resorted to, but the former are often deceptive, and the latter test is generally only sufficient to show that gold does, or does not, exist in the small samples tried.

THE TORRENS RIVER.—During the past few months a number of men have been working for gold at a spot about two miles above the gorge, where the Sixth Creek comes in, and also along the bed of that creek.

Alluvial gold has been found in the river by sluicing, on section No. 6154, near the Gumeracha bridge, and on sections Nos. 6074, 6060, 6113, and for some distance along the river near Blumberg, and elsewhere. What portions will prove payable can only be ascertained by thorough work.

The river is auriferous from its source to the gorge where it issues from the hills, and from thence it has probably carried gold down towards the sea. This can only be proved by testing the deep tertiary deposits on the Adelaide plains.

TWIGHAM DIGGINGS.—About two miles eastward of the Ulooloo diggings a small patch of alluvium has been worked for gold. There is no information available as to results obtained. (1886.)

TWO-IN-THE-BUSH MINE. (See WOODSIDE.)

THE ULOOLOO GOLDFIELD is situated about twenty miles north of Hallett, in the hundred of Hallett. It was discovered in 1870-1, and the first workings were on section No. 650, on what is known as the White Lead. Workings were also opened on Noltenius's Creek, sec. 673, and were followed down on to Coglin's Creek. Since the discovery, work has been carried on in an intermittent manner. It has been impossible to ascertain the total quantity of gold obtained; but £18,000 worth has been (August 1886) transmitted through the post office at Hallett—the nearest township. No quartz reefs or veins have been worked, the gold found being alluvial, and generally coated and mixed with iron ore. Along Coglin's Creek the gold is found in two formations—the alluvium of the present creek, and in the old creek-bed or deep lead, following the creek and sometimes crossing it. In the present creek the sinking was only a few inches in depth, whilst in the deep lead it ranged from 20ft. to 30ft.. Both the lead and the creek follow the strike of the

rocks, viz., north and south. Some parts of the diggings were fairly rich. Attempts to prospect some of the deep leads have been frustrated by the great influx of water at about 40ft., but this could be overcome by pumping. The absence of water, except in the Ulooloo Creek, is a drawback to efficient prospecting, and another matter that is against the success of the field is, that the area of Crown lands is small and is surrounded by freeholds. The neighbouring country is strongly auriferous. With regard to results obtained by miners, the Warden of Goldfields reported on July 5th, 1886, that Ellis and Carpenter had washed 11ozs. of gold from seventeen loads of dirt, and that Herbert's party had washed 5ozs. from two and a half loads. The Government prospecting party got various amounts of gold, ranging from 2dwts. up to 13dwts. per load.

The rocks of this field consist of clay and calcareous slates and limestones, with quartzose, sandstone, and sandstone bands. They contain numerous reefs and veins of quartz and ironstone, and the surface is frequently strewn with fragments of these veinstones.

Uraidla Mine is on section No. 128, hundred Onkaparinga. Tunnels have been driven into the rock, but there is no evidence to show how much gold, if any, was obtained. Large quartz veins outcrop in the neighbourhood, and the place is a favourable one for gold, The rocks pierced by the tunnel are kaolinized clayslates and sandstones traversed by ferruginous quartz veins.

Victoria Gold Mine. (See Barossa Goldfield.)

The Victoria Gold Mine was opened by a company in January, 1846. The mine is ten miles east of Adelaide, and, as nearly as can be ascertained, in the neighbourhood of the Montacute. The property of the company comprised 147 acres of land; the paid up capital was £1,500 in 750 shares of £2 each. The *Royal South Australian Almanac*, 1848, has the following account:—

> Soon after the operations of the company commenced, a vein of auriferous gossan was discovered in the principal shaft, and at length it was found impregnated with native gold of almost perfect purity. Genuine specimens of the gold soon adorned the cabinets of the curious, and the working jewellers of Adelaide were employed to mount South Australian gems in some of the virgin gold thus found in the province. The excitment was extreme; the £2 shares went rapidly up to £30 each, and the *fortunate* purchasers at the advanced price thought their fortunes were made. But all at once the prizes wore very much the appearance of blanks: a ruinous reaction ensued; the price of shares went down to £3 each.

This mine was not being worked in 1852.

Watt's Gully. (See Gumeracha.)

Wickham Hills.—Wm. Porteus, of Echunga, reports that about twelve years ago he assisted in sinking three shafts in the Wickham Hills, in search for a deep lead. One was put down 57ft.; a second, half a mile from the first, was sunk to 63ft. and bottomed on hard rock, dipping at an angle of 45°. Between these two a third shaft was sunk to the water level at 107ft. but not bottomed. Small quantities of gold were found in shallow sinking on the sides of the hills.

The Woman in White Mine is situated one and a half miles south of old Boolcoomatta Station, and 104 miles in a direct line north-east of Petersburg. The lode is very large, and consists of a quartzose, feldspathic, ferruginous veinstone, often stained with carbonate of copper. Its width is unknown, as no particular walls or junction with the bedrock have been observed.

The workings consist of an excavation from 30ft. to 40ft. wide, and from 20ft. to 30ft. deep. From this has come the stone for crushing. About 1,000 tons have been raised and treated, and the yield of gold per ton has varied from 8dwts. to 17dwts.

In addition to the excavation, several prospecting holes have been sunk along the line of reef. The water level is about 70ft. from the surface.

The gold is fine, and is disseminated through the veinstone. This, besides being stained with carbonate of copper, often carries copper pyrites. There is a five-stamp battery and an engine on the ground.

The bedrock consists of metamorphic, micaceous, and hornblendic gneissic schists, traversed by coarse granite dykes. In the vicinity of the workings there is a mass of diorite and micaceous diorite; but what relation this bears to the veinstone cannot be disclosed until more work has been done.

The mine is not now working, but a further exploration is to be desired, as nothing has been proved by the little work hitherto done. There is good reason to suppose that payable gold will be met with.

THE WOODSIDE MINES.

THE RIDGE GOLD MINE is situated on part section 5249, hundred of Onkaparinga. There are three lodes bearing 10° east of north, with an underlay of 40° east. They vary in width from 1ft. to 16ft. The country rock consists of decomposed schist and sandstone, and the veinstone associated with the metallic minerals is quartz. Five shafts have been sunk, the deepest being 140ft. The main shaft was sunk to a depth of 120ft. vertical, but had to be abandoned in consequence of quicksand being met with. The water level was reached at 45ft.; drives and levels have been made to a total length of about 1,700ft. Two thousand five hundred tons of stone have been raised, and have yielded 380ozs. of smelted gold to the value of over £1,213. The crushings, however, at this mine were trial crushings and intermittent. The gold occurs in shoots. The mine is not working (1887).

THE NEW VENTURE is on section 5260. Some work was done in driving tunnels, but no gold was found.

THE PARLIAMENTARY CLAIM is in section 5050 and 5051. A number of shallow openings have been made. Near the reef there was a run of surface gold ten yards wide, going half a grain to the dish.

THE BRIND MINE is on the west side of section No. 5256, hundred of Onkaparinga, and adjoins the Bird-in-Hand Mine. The reef at the south end is 6ft. thick, and consists of white quartz, inclosing pyrites and some carbonate of lead in cavities. It strikes a little west of north and dips E. 25° N. at an angle of 57°. A shaft has been sunk to a depth of 38ft.

A portion of the surface was sluiced to a depth of 3ft., and 50ozs. of gold were obtained. This included nuggets of the following weights:—one of 16ozs., and others of 9ozs., 7ozs., 5ozs., and 4ozs.

THE MINT MINE is on part section No. 5259, hundred of Onkaparinga. It contains one lode bearing N.W., and having an underlay of one in two to the N.E. The width varies from 1ft. to 3ft. The stone is auriferous quartz, and occurs in patches, but a little fine gold is distributed through the mass of the ore. About thirty tons have been raised, and the average yield of gold to the ton is calculated to be about 4dwts. This is exclusive of specimens obtained.

The workings consist of two underlay shafts, the deepest of which is about 60ft., and a drive 20ft. in length. The water level is at the depth of 55ft.

Very rich specimens were found in this mine at a depth of 40ft. on the footwall of the reef. They were lying on a ledge formed by the rock. Some of them contained as much gold as quartz.

THE EUREKA MINE is on section No. 5259, hundred of Onkaparinga. It contains one lode bearing 24° west of north and underlying 42° east. It is 6ft. wide and carries gold in quartz. The country rock consists of sandy schist, with bands of sandstone and dioritic slate. Four shafts have been sunk, one of which is sunk on the underlay of the reef, and is 229ft. deep. The drives and levels extend a distance of 500ft. The water level is reached at 47ft. The ore occurs in shoots dipping slightly north.

The stone containing free gold has been treated by the battery, and yielded an average of 12dwts. of gold per ton; but the reef, as it continues in depth, has developed galena, blende, iron and copper pyrites. These yield on assay from 2ozs. to 3ozs. of gold, and from 5ozs. to 10ozs. of silver to the ton.

Owing to the mine not having been regularly worked it is impossible to give the quantity or value of the stone raised in past times.

THE BIRD-IN-HAND MINE is on section 5278, hundred of Onkaparinga. There are three lodes bearing 10° east of north, with an underlay of 40° east. Their width varies from 1ft. to 8ft. The country rock consists of decomposed schist, with bands of sandstone, and the veinstone associated with the metallic minerals is quartz. Seven shafts have been sunk, one to a depth of 341ft; the drives and levels extend for about 4,000ft. in length. The water level was reached at 90ft. The quantity of stone raised equals 17,014 tons, and the smelted gold obtained is 6,079ozs., of the value of £18,642 15s. Stone taken from the stopes between the 210ft. and 275ft. level gave 1,544ozs. of smelted gold from 3,183 tons of quartz. The gold occurs in shoots apparently perpendicular to the vein.

This mine is still beng worked, and machinery consisting of a 50-inch cylinder beam-engine, and 18-inch pumps, has recently been erected. (1887.)

THE TWO-IN-THE-BUSH MINE is on part section 5261, hundred of Onkaparinga. There is one lode, bearing 10° east of north, with an underlay of 40° east. The width varies from 1½ft. to 18ft. The country rock consists of decomposed schist and sandstone, and quartz is the veinstone associated with the metallic minerals. Three shafts have been sunk, the deepest of which has 265ft. vertical. Drives and levels measuring about 1,000ft. in all, have been made. The water level was reached at 100ft.; 2,198 tons of stone have been raised, and 386ozs. of smelted gold, valued at over £1,130, have been obtained. The crushings on this mine were trial ones, and intermittent. The principal work done was the sinking of the main shaft, and the endeavour to open up the ground at the deepest possible point that could be drained by the pumps. This mine is not now being worked. (1887.)

THE NEW ERA GOLD MINE is situated on part sections 5263 and 5267, hundred of Onkaparinga, about two and a half miles from Woodside. There is one main reef bearing north and south, and two spurs bearing to the N.E. The underlay is 1ft. in 3ft. to the east, and the width varies from 6ft. to 20ft. The stone consists of auriferous quartz, highly ferruginous, and has yielded 4dwts. to 8ozs. of gold to the ton. About 14,000 tons of stone have been raised and crushed, and have yielded gold to the value of £18,500. The veinstone associated with the metallic minerals is ferruginous silica, and the country rock consists of pipeclay, mica schist, sandstones, and diorite. The gold occurs in patches, but fine gold is distributed through the whole width of the stone, and in some places is found in the surrounding country. The best shoot is where the spur reef joins the main north aad south reef, and dips to the north about 5ft. in 100ft. One vertical and six underlay shafts have been sunk, the deepest being 120ft. There are two drives—one of 900ft. at the 112ft. level, and one of 100ft. at the 50ft. level. The water level is reached at 50ft. (1887.) [Since writing above, two crushings of stone have yielded 428ozs. 14dwts. 12grs. of gold.]

THE BIRD-IN-HAND EXTENDED MINE is two and a half miles east of Woodside, and is situated on section No. 5250, hundred of Onkaparinga. It was opened some years since, but owing to want of funds the work has been discontinued. Gold was frequently seen in the stone, but none of it was crushed. There is one lode with a north and south bearing and underlay; it is 20ft. wide, and is a continuation of the reef in the Bird-in-Hand property. The ore is ferruginous quartz, which on assay yielded at the rate of 17dwts. to 1oz. of gold per ton. It occurs in a large broken reef, consolidating under foot; about fifty tons of ore were raised.

The workings consist of one shaft sunk to a depth of 100ft., and drives extending 250ft. This mine is not being worked at the present time. (1887.)

MOUNT CHARLES, near Woodside. Some shallow excavations have been made in quartz reefs in this neighbourhood. So far, however, as can be ascertained no quartz was crushed or gold obtained.

THE FOUNTAIN HEAD MINE is on section No. 5241 hundred of Onkaparinga. A vertical shaft has been sunk to a depth of 92ft., and at 74ft. a reef was struck. This, it is reported gave rich prospects of gold. An influx of water, however, stopped the work. An underlay shaft has been sunk on the same reef to a depth of 27ft., and gold was found in the stone; two other shafts were sunk to depths of 85ft. and 42ft respectively. The quartz is cellular, and contains iron pyrites; gold is visible on crushing, and also in the quartz. The width of the reef is about 2ft. 6in. An assay of a sample of the quartz, in which gold was not visible, yielded gold at the rate of 1oz. 6dwt. 3grs. per ton. (1883.)

THE NEST-EGG MINE is on section 5297, hundred of Onkaparinga. A shaft has been sunk to a depth of 52ft. on a quartz vein about 4ft. wide. A vertical shaft, 84ft., in the direction of the underlay, has also been sunk to 50ft., and is connected with the first shaft by a drive. This passed through two other quartz veins. A main shaft has been sunk 120ft. to strike the reef on the underlay. Owing to the quantity of water met with in sinking, operations had to be suspended. The underlay of the Fountain Head reef will probably be met with in sinking. (1884.)

YUDNAMUTANA GOLD DISCOVERY.—Near the Yudnamutana Mine the gravel and detritus has been worked to a slight extent for gold. Gold is also found here and there in the creeks and watercourses; but the work done simply consists of some very shallow holes and surfaceing. But the last-named operation is difficult, owing to the creek beds and flats being filled with boulders. Prospecting might be carried on with advantage lower down the creeks, where they become less steep.

This discovery is believed to have been made by a Government prospecting party about the year 1874.

GOLD BOUGHT BY THE ENGLISH, SCOTTISH, AND AUSTRALIAN CHARTERED BANK.

The following return of gold bought by the E.S. & A.C. Bank, from November 22nd, 1886, to April 15th, 1887, and the table of prices have been supplied through the courtesy of the manager (Mr. Cowle):—

Locality.	Ozs.	dwts.	grs.
Teetulpa	10,571	16	0
New Era	474	4	0
Barossa	30	2	12
Echunga	9	5	18
River Torrens	8	4	18
Blackwood Gully	5	7	0
Peake	29	12	18
Sundries from diggings near Adelaide	11	15	2
	11,140	7	10

2/

TABLE OF PRICES GIVEN BY THE ENGLISH, SCOTTISH, AND AUSTRALIAN CHARTERED BANK FOR ALLUVIAL GOLD.

	£	s.	d.	
Peake Diggings	3	18	6	per oz.
Teetulpa Diggings	3	17	0	"
Barossa Diggings	3	16	0	"
Echunga Diggings	3	14	0	"
Gumeracha Diggings	3	12	6	"
Blackwood Diggings	3	12	6	"
Morialta Diggings	3	12	6	"
Houghton (Torrens river) Diggings	3	12	6	"
Forest Range Diggings	3	15	0	"

EXPLANATORY LIST OF TERMS USED IN THE TEXT.

A.

AZURITE (*See* Blue Carbonate of Copper).
ARAGONITE.—A compound of calcium (*See* Calcite).
ARENACEOUS.—Sandy.
ATACAMITE.—Copper oxichloride. Composition—Chlorine 16·64, oxygen 11·35, copper 11·25, water 12·66.
ACTINOLITE.—A variety of hornblende, of light-green colour.
ARGILLACEOUS.—Containing clay.

B.

BLUE CARBONATE.—Azurite, Blue Malachite. Colour deep blue, azure blue, Berlin blue. Transparent to nearly opaque. It accompanies other ores of copper. Valuable when abundant. Composition—Copper oxide 69·2, carbonic acid 25·6, water 5·0
BRECCIA—Conglomerate, composed of coarse angular fragments of rock of any kind.
BLACK ORE (*See* Melaconite).
BORNITE, ERUBUSCITE.—Variegated copper pyrites. Composition—Sulphur 28·6, copper 55·58, iron 16·36, but varies greatly. Occurs with other copper ores in granitic and other allied rocks, and also in stratified formations.
BROWN HEMATITE, LIMONITE.—Usually massive. Colour dark-brown and black to ochre yellow. Composition—Iron sesquioxide 85·6, water 14·4. Is connected with rocks of all ages, but has resulted from the decomposition of other iron ores. It is one of the most valuable ores of iron.
BOURNONITE.—An ore of copper. Contains—Sulphur 29·6, antimony 25·0, lead 42·24, copper 13·0.

C.

COPPER PYRITES, CHALCOPYRITE.—Copper and iron sulphide. Composition—Sulphur 34·9, copper 34·6, iron 30·5; resembles native gold and also pyrites. Distinguished from gold by crumbling when an attempt is made to cut it, and from pyrites in its deeper yellow colour, and in yielding easily to the point of the knife instead of striking fire with a steel. Is very poor in copper, 6½ per cent. being about the average amount contained in it.
CALCITE, CALC SPAR, CALCIUM CARBONATE.—Occurs fibrous, with a silky lustre; sometimes lamellar; often coarse or fine granular, and compact. Composition—Carbonic acid 44, lime 56.
CERUSSITE.—White lead ore. Lead carbonate. Colour, white, greyish, light or dark. Lustre, adamantine; brittle. Associated usually with galena.
CHALCOCITE.—Copper glance, vitreous copper ore. Composition—Sulphur 20·2, copper 79·8. Occurs with other copper ores in beds and veins.
CHALCOPYRITE (*See* Copper Pyrites).
CUPRITE.—Red copper ore. Colour, deep red of various shades. Composition—Oxygen 11·2, copper 88·8.
CHERT.—An impure variety of flint.
CARBONATE OF LEAD, CERUSSITE.—Colour, white, greyish, light or dark; brittle. Composition—Carbonic acid 16·5, lead oxide 83·5. Usually associated with galena. It is the "white lead" of commerce.
COPPER GLANCE (*See* Chalcocite).
CHALYBITE.—Spathic iron, carbonate of iron.
CHRYSOCOLLA.—Hydrous copper silicate. Usually in incrustations, also in thin seams and stains. Colour, bright green, bluish green. Composition—Silica 34·2, copper oxide 45·3, water 20·5. The mineral varies much in the proportion of its constituents, as it is not crystallised. It accompanies other copper ores. In its pure state this ore affords 30 per cent. of copper, but as it occurs in the rock. will hardly yield one-third of this amount.
CALC SPAR (*See* Calcite).

D.

DIOPTASE.—Silicate of copper. Colour, emerald green. Transparent to nearly opaque. Composition —Silica 38·1, copper oxide 50·4, water 11·5.

DIORITE.—An igneous rock, composed of hornblende and feldspar. Colour, often greyish white to greenish white for the coarser kinds; olive green to blackish green for the finer.

F.

FERRUGINOUS.—Charged with iron.

FELDSITE or FELSITE is an igneous rock, occurring in dykes and other eruptive masses.

FLUCAN.—Clayey matter in veins.

G.

GREY ORE, TETRAHEDRITE.—Grey copper. Colour between steel grey and iron black. It sometimes contains 30 per cent. of silver in place of part of the copper, and is then called argentiferous tetrahedrite

GREEN CARBONATE, MALACHITE.—Colour, light green. It usually accompanies other ores of copper, and forms incrustations, which, when thick, leave the colours banded and delicate in thin shades and blending.

GOSSAN.—A porous veinstone composed chiefly of iron oxide.

GALENA.—Sulphide of lead. The ordinary lead ore of commerce. Composition, lead 86·6 per cent., sulphur 13·4 per cent.

GANGUE.—The non-metallic material filling lodes.

GYPSUM.—Hydrous calcium sulphate. Occurs in crystals, in laminated masses, often of large size; in fibrous masses, with a satin lustre; in radiating forms; also granular and compact. Composition—Sulphur trioxide 46·5, lime 32·6, water 20·9; when burned becomes "plaster of paris."

H.

HEAVY SPAR, BARITE, SULPHATE OF BARYTA.—Composition—Sulphur trioxide 34·3, baryta, 65·7. Is often present as the non-metallic material, filling lodes. Is used to adulterate white lead.

HORNBLENDE SCHIST, a schistose rock, consisting of hornblende, with usually more or less quartz, but sometimes wholly hornblende.

I.

IRON PYRITES, IRON BISULPHIDE.—Usually in cubes, occurs also in imitative shapes and masses. Colour, bronze yellow; brittle. Composition—Sulphur 53·3, iron 46·7. Often contains gold, and is then called auriferous pyrites; is almost invariably associated with quartz and other veinstones in lodes.

K.

KILLAS.—A Cornish term for hard shale or slate.

KAOLIN.—China or porcelain clay. General composition—Silica 47·2, alumina 39·1, water 13·7.

M.

MAGNESIAN LIMESTONE or DOLOMITE is composed of carbonate of lime and magnesia.

MELACONITE.—Black copper. An oxide of copper, occurring as a black powder, and in veins, or along with other copper ores. It results from the decomposition of the sulphides and other ores.

MICA SCHIST.—A glistening rock consisting largely of mica, with quartz and some feldspar. Owing to the quantity of mica it splits easily into leaves.

MUNDIC.—A miner's name for pyrites.

MAMMILLARY.—In rounded breast-like forms.

MURIATE OF COPPER.—Chloride of copper.

N.

NATIVE COPPER, METALLIC COPPER.—In masses or plates, of aborescent and filiform shapes. Colour, copper red. Ductile and malleable. Often contains a little silver disseminated throughout it. Accompanies the ores of copper.

O.

ORTHOCLASE.—Common feldspar. Colours, light; white grey and flesh-red common; also greenish and blueish white and green. Composition—Silica 64·7, alumina 18·4, potash 16·9. It is one of the constituents of granite, syenite, gneiss, and other related rocks; also of porphyry and trachyte.

P.

PORPHYRY.—An igneous rock, in which are angular crystals, such as quartz or feldspar, are disseminated through a homogenous base or matrix.

Q.

QUARTZITE.—A rock formed from sandstone by metamorphism through the infiltration of silica.

S.

SULPHIDE ORES.—Mixed with sulphur.
SULPHATE OF BARYTA (*See* Heavy Spar).
SELENITE, SULPHATE OF LIME (*See* Gypsum).
SPATHIC IRON.—Siderite, iron carbonate. Composition—Carbon dioxide 37·9, iron protoxide 62·1. Occurs in rocks of various ages, and often accompanies metallic ores. The largest deposits are in mica schist and clayslate.
STEATITE or SOAPSTONE.—A variety of talc, grey or greyish green, and either massive, crystalline granular, or impalpable; very greasy to the touch.
SYENITE.—A granitoid rock, consisting of hornblende and orthoclase, with or without quartz.
SPECULAR IRON ORE.—Hematite, iron sesquioxide. Colour, dark steel grey or iron black, and often, when crystallised, having a highly glossy lustre. Composition—Oxygen 30, iron 70.

T.

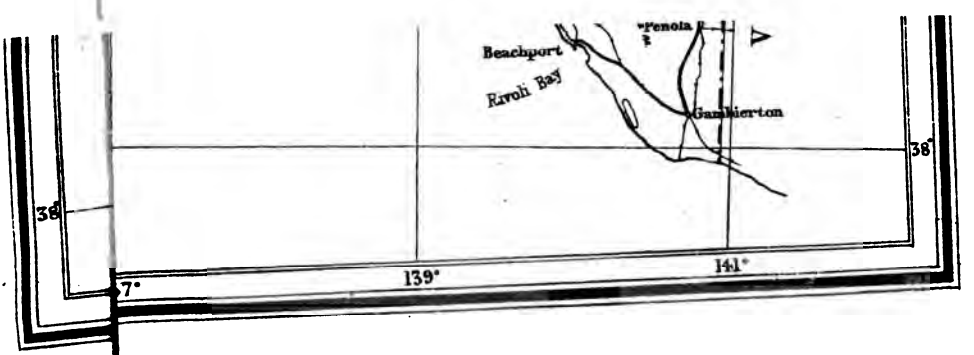
TALCOSE SCHIST, a kind of schist consisting chiefly of talc.
TILE ORE, an earthy variety of red copper ore (cuporite).
TETRAHEDRITE (*See* Grey Copper).

Return of the Quath Australia, Exported Annually.

Year.	nd ne.	Manganese. Quantity.	Manganese. Value.	Gold. Quantity.	Gold. Value.	Total Declared Value of all Mineral Exports Annually.
	£	tons.	£	ozs.	£	£
1840	—	—	—	—	—	*nil*
1841	—	—	—	—	—	390
1842	—	—	—	—	—	*nil*
1843	—	—	—	—	—	127
1844	—	—	—	—	—	6,436
1845	—	—	—	—	—	13,484
1846	—	—	—	—	—	142,251
1847	—	—	—	—	—	174,190
1848	—	—	—	—	—	321,943
1849	—	—	—	—	—	219,547
1850	—	—	—	—	—	365,464
1851	—	—	—	—	—	310,916
1852	—	—	—	—	—	374,778
1853	—	—	—	—	—	176,744
1854	—	—	—	—	—	94,831
1855	—	—	—	—	—	155,557
1856	—	—	—	—	—	408,042
1857	—	—	—	—	—	458,839
1858	—	—	—	—	—	373,282
1859	—	—	—	—	—	411,018
1860	—	—	—	—	—	446,537
1861	—	—	—	—	—	452,172
1862	—	—	—	—	—	547,619
1863	—	—	—	—	—	542,393
1864	—	—	—	—	—	691,624
1865	—	—	—	—	—	620,112
1866	—	—	—	—	—	824,501
1867	61	—	—	—	—	753,413
1868	45	—	—	—	—	624,022
1869	60	—	—	—	—	627,152
1870	30	—	—	—	—	574,090
1871	20	—	—	—	—	648,569
1872	68	—	—	—	—	806,364
1873	75	—	—	76½	293	770,590
1874	60	—	—	1,111	4,175	700,323
1875	20	—	—	1,802½	7,034	762,386
1876	00	—	—	2,501	9,888	602,772
1877	—	—	—	—	—	565,099
1878	—	—	—	324	1,225	409,749
1879	—	—	—	20	90	353,781
1880	—	—	—	—	—	347,246
1881	—	—	—	220	880	420,558
1882	—	136	664	764	3,080	462,270
1883	—	333	2,079	2,671	10,534	402,450
1884	—	59	236	3,970	15,469	491,950
1885	—	—	893	4,692	18,295	344,451
1886	—	1,550	10,985	8,825	32,535	275,008
	739	2,078	14,857	18,152	70,963	19,075,040

	£
NOTE.—The total expo e value of	1,056
" " of	1,022
" " o the value of	8,821
" "	70

G


Beachport
Rivoli Bay
Penola
Gambierton
38°
38°
139°
141°